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# CHAPTER 8: PROPOSED PHASE III EARLY RESTORATION PROJECTS: TEXAS

## 8.1 Introduction

Following the *Deepwater Horizon* oil spill (Spill), Texas Trustees engaged coastal governments, stakeholders, non-governmental organizations, state and regional agencies, and the public through a variety of public outreach and coordination efforts to discuss NRDA, the restoration planning process, and potential restoration projects related to the Spill. In addition to the meetings discussed in Section 2.1.5 of this document, State Trustees met with stakeholders to provide information and solicit suggestions. Numerous conference calls were also held to coordinate with these stakeholders. Texas also solicited restoration project ideas from the public through outreach at coastal events, including the Freeport Fishin' Fiesta, the Groundwater to the Gulf Summer Teacher Institute, Galveston Bay Days, and the Texas General Land Office (TGLO) Coastal Expo.

Over 250 project ideas in or pertinent to Texas have been received through the Gulf Spill Restoration Site, and have been considered for Early Restoration.<sup>1</sup> Based on outreach efforts, Texas Trustees compiled a list of potential projects for restoration of injured natural resources and services, including recreational use services, and evaluated them based on their alignment with the project evaluation criteria introduced in Chapter 2 of this document. From there, the projects were refined in a group to address multiple categories of injured resources, as well multiple methodologies for implementation. A final consideration was also the likelihood that specific projects could be negotiated successfully with BP. Texas Trustees will continue to accept restoration project ideas. To submit a project idea online, or to view project ideas that have already been submitted, please go to the Gulf Spill Restoration Site (<http://www.gulfspillrestoration.noaa.gov/>). Projects proposed but not selected for this phase of Early Restoration planning will be considered for future stages of both early and long-term restoration.

Based on the process outlined above, analysis of the evaluation criteria set forth in the OPA regulations and the Framework Agreement, the Trustees are proposing the following Phase III Early Restoration projects in Texas:

1. Expansion of the George Vancouver (Liberty Ship) Artificial Reef in Texas State Waters of the Gulf of Mexico (Freeport Artificial Reef Project);
2. Creation of the Matagorda Artificial Reef in Texas State Waters of the Gulf of Mexico (Matagorda Artificial Reef Project);
3. Creation of an Artificial Reef on the Mid/Upper Texas Coast (Ship Reef Project);<sup>2</sup>
4. Sea Rim State Park Improvements Project (Sea Rim State Park Project); and
5. Galveston Island State Park Beach Redevelopment Project (Galveston Island State Park Project).

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<sup>1</sup> As of September 16, 2013.

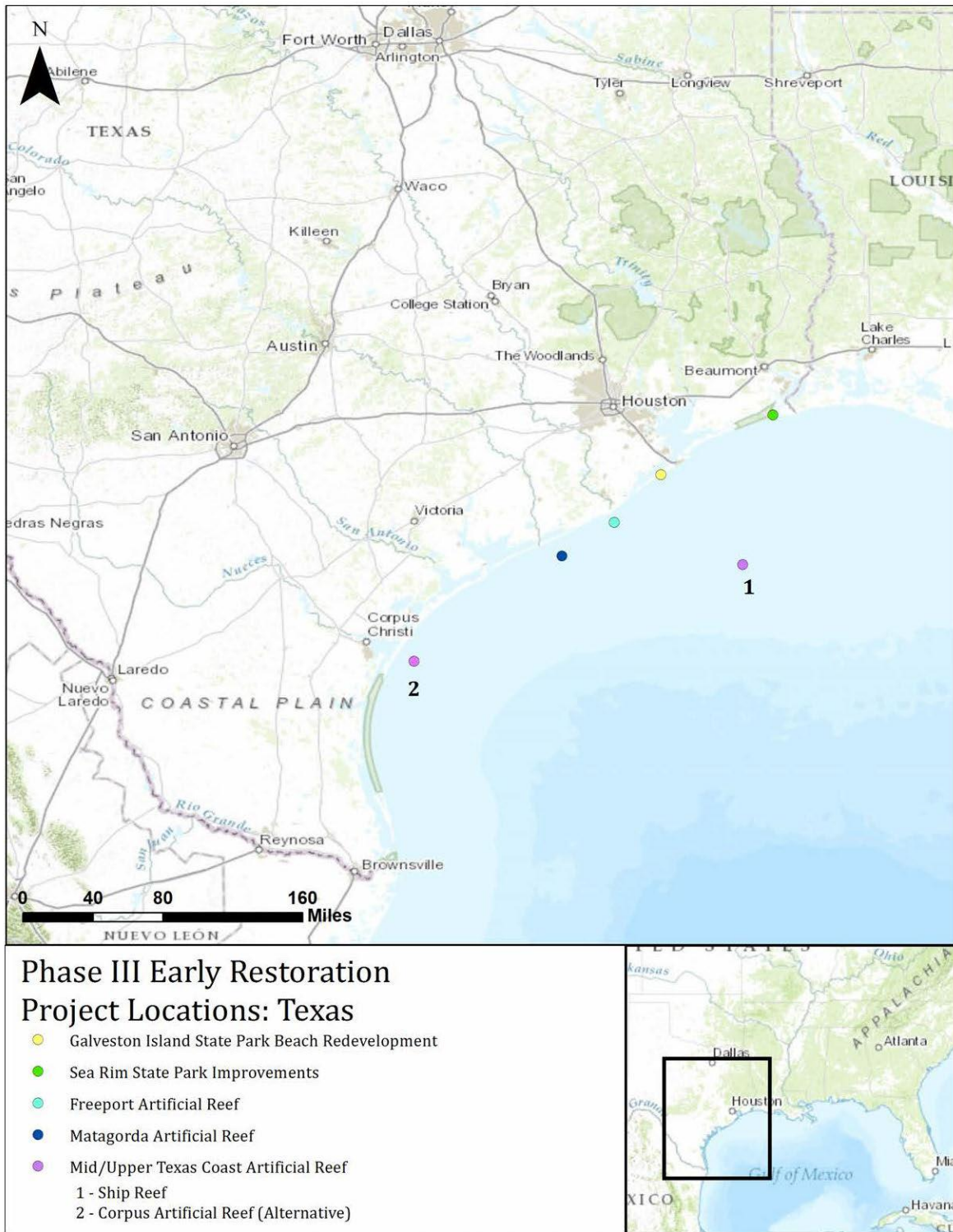
<sup>2</sup> If the Ship Reef Project becomes technically infeasible (if, e.g. an appropriate ship cannot be obtained), an alternative project, the Expansion of the Corpus Christi Artificial Reef in Texas State Waters of the Gulf of Mexico (Corpus Artificial Reef Project) will be implemented instead. Project information and analysis of the Corpus Artificial Reef Project also is provided in this chapter.

The figure below provides a map of the locations of all of the proposed projects in Texas. These projects are consistent with the goal of compensating the public for natural resource injuries resulting from the Spill. The Early Restoration projects proposed in this Phase III ERP/PEIS are not intended to fully compensate the public for injuries caused by the Spill. Additional restoration actions will be required.

Within the remainder of this chapter, there is a subsection for each proposed Phase III Early Restoration project. Each project-specific subsection begins with a general description of the project and relevant background information, followed by: (1) a discussion of the project's consistency with project evaluation criteria; (2) a description of planned performance criteria, monitoring and maintenance; (3) a description of the type and quantity of Offsets BP would receive upon project implementation; and (4) information about estimated project costs.

Following project information is a project-specific environmental review, which provides information regarding the individual project's affected environment and analysis about anticipated environmental consequences of each proposed project. Although each of the proposed projects falls within the Trustees' preferred Programmatic Alternative (Alternative 4) identified and evaluated in Chapters 5 and 6, the Trustees have prepared individual environmental reviews to help ensure that project-specific environmental compliance concerns are addressed.

In order to determine whether an action has the potential to result in significant impacts, the context and intensity of the action must be considered. Context refers to area of impacts (local, state-wide, etc.) and their duration (e.g., whether they are short- or long-term impacts). Intensity refers to the severity of impact and could include the timing of the action (e.g., more intense impacts would occur during critical periods like high visitation or wildlife breeding/rearing, etc.). Intensity is also described in terms of whether the impact would be beneficial or adverse. Both context and intensity were considered in the project-specific environmental reviews.

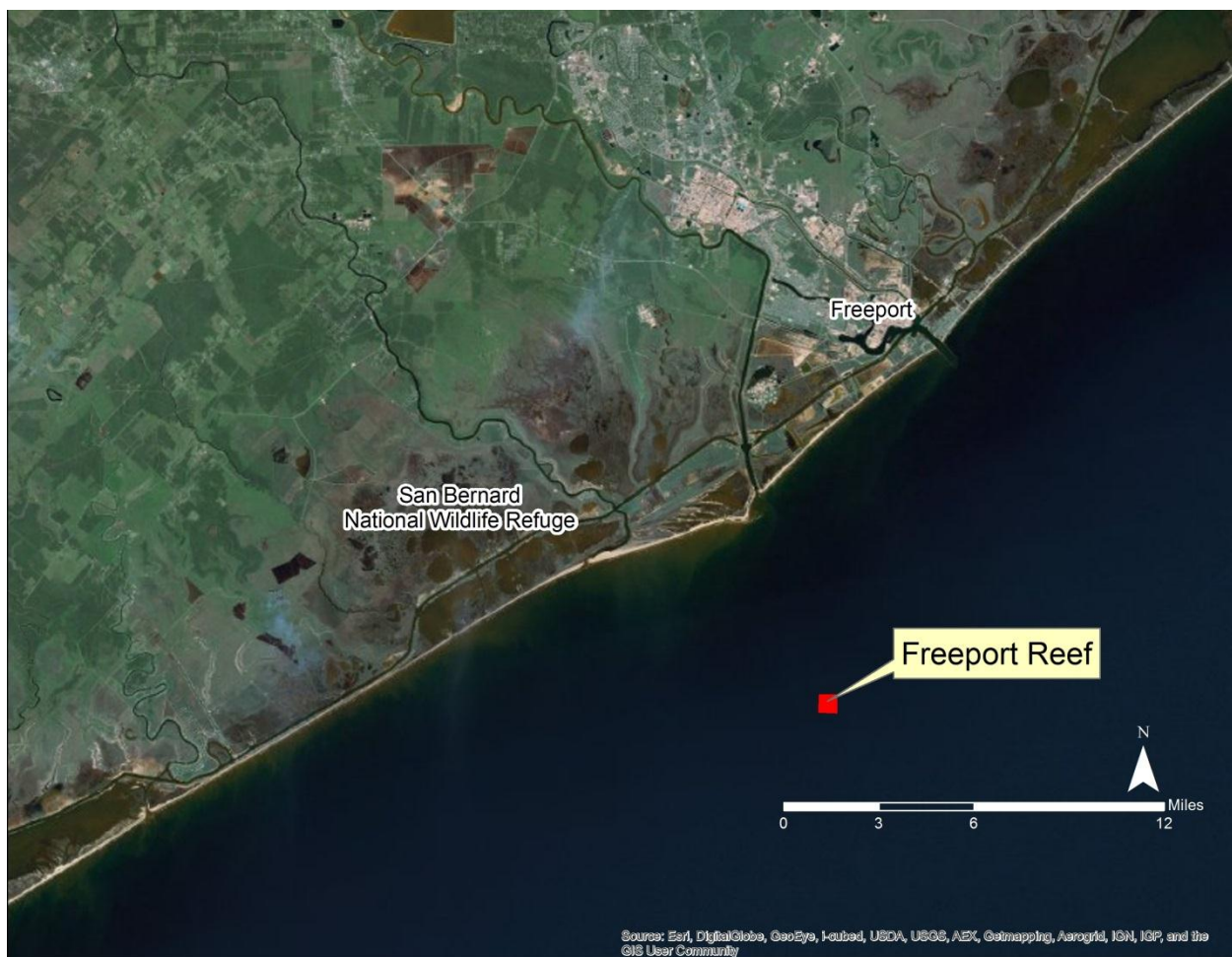


Location of all Phase III Early Restoration projects proposed in Texas.

## 8.2 Freeport Artificial Reef Project: Project Description

### 8.2.1 Project Summary

The proposed Freeport Artificial Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (Outer Continental Shelf Block Brazos BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico, approximately 6 miles from Freeport, Texas (Figure 8-1). The current reef site is permitted for 160 acres, but only has materials in 40 acres. The proposed project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. These improvements would enhance recreational fishing and diving opportunities. The estimated cost for this project is \$2,155,365.



**Figure 8-1. Location of the proposed Freeport Artificial Reef Project.**

### 8.2.2 Background and Project Description

The purpose of the Freeport Artificial Reef Project is to enhance recreational fishing opportunities (and limited diving opportunities since water clarity is not usually conducive for diving) for Texas. Texas Parks and Wildlife Department (TPWD) created the Artificial Reef Program in 1990 after the Texas Legislature



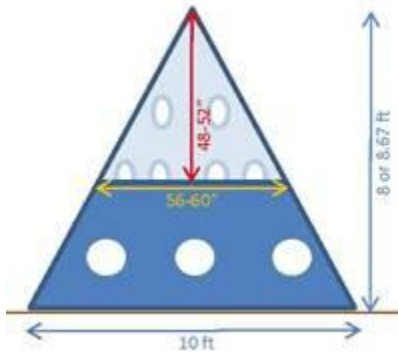
passed the Texas Artificial Reef Act in 1989 (Title 5, Texas Parks and Wildlife Code Chapter 89). The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing and diving opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and divers to provide a significant fiscal boost to local economies.

The proposed project will increase the amount of reef materials in a currently permitted artificial reef site, the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Brazos (BA-336). The current reef site is permitted for 160 acres, but only has materials in 40 acres of the site. The 40 acres contain the Vancouver Liberty Ship, an obsolete 441-foot WWII ship, as well as additional reef material including quarry rock ( $\geq 1$  ton), concrete culverts, and 100 pyramid structures similar to those proposed for this project. The proposed project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet, about 6 miles from Freeport, Texas.

The project site is a legacy reef that was originally permitted and created in 1976 with the sinking of the George Vancouver Liberty Ship. The reef permit was later transferred from the Texas Coastal and Marine Council to TPWD in the 1980s before the TPWD's Artificial Reef Program was formally established. The TPWD Coastal Resources Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) provided input into the expansion of the reef. The reef is utilized by numerous fishermen. Anecdotal information confirms that the George Vancouver Liberty Ship has attracted divers over the years; however diver use is limited by low visibility at depth due to water clarity. Commercial trawl fishermen avoid the reef site as it is a well-known "wreck" marked with a navigational buoy and on NOAA charts. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. Previous deployments at the permitted reef site placed artificial reef materials (the Vancouver Liberty Ship, quarry rock, concrete culverts, and pyramid structures) in a portion of the 160-acre reef site. The Freeport Artificial Reef Project will randomly space 800 to 950 additional predesigned pyramids in the remaining portions of the permitted area.

Texas' artificial reefs are generally created and placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring. This project will use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to

allow sea turtles to move freely in and out of the structure (Figure 8-2). This modification was required by the National Marine Fisheries Service (NMFS) in order to complete the Endangered Species Act (ESA) consultation (NMFS 2014a). Each pyramid should penetrate the substrate by no more than 2 feet, and the pyramids will be randomly spaced over the designated portion of the 160-acre permitted reef.



**Figure 8-2. An example of the predesigned pyramid structures with the open side.**

### 8.2.3 Evaluation Criteria

This proposed Freeport Artificial Reef Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Freeport Artificial Reef Project is intended to enhance recreational fishing opportunities (and limited diving opportunities since water clarity is not usually conducive for diving) by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas, which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The project would enhance opportunities for the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible, utilizes proven techniques with established methods and documented results, and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The site selection of this reef occurred through the work of the Texas Coastal and Marine Council in the early 1970s. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses,

avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The TPWD Coastal Resource Advisory Committee provided input into the expansion of the reef site. As a result, the proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.2. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the best management practices (BMPs) and measures to avoid or minimize impacts described in Section 8.2 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

#### **8.2.4 Performance Criteria, Monitoring and Maintenance**

The Freeport Artificial Reef Project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to increase the amount of reef materials in a currently permitted artificial reef site (BA-336) through the random placement of 800 to 950 predesigned concrete pyramids within the open portions of the permitted reef site.

Performance criteria for this project will include a determination of successful construction of the project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

While not funded through Early Restoration, recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the reflective

TPWD decal as needed, and replacing or repairing the buoy as needed. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

#### 8.2.5 Offsets

The Early Restoration benefits provided by the project, also known as Natural Resource Damage (NRD) Offsets, are \$4,310,730 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill<sup>3</sup>. This Offset is based on the use of a benefit-to-cost (BCR) ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

#### 8.2.6 Cost

The total estimated cost to implement this project is \$2,155,365. This cost reflects estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

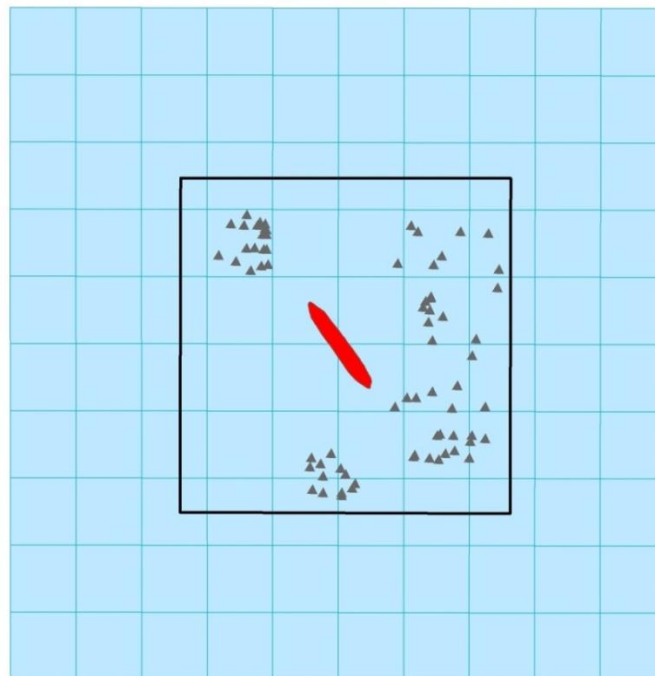
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<sup>3</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

### 8.3 Freeport Artificial Reef Project: Environmental Review

The proposed Freeport Artificial Reef Project would increase the amount of reef materials in a currently permitted artificial reef site (Outer Continental Shelf Block Brazos BA-336), the George Vancouver (Liberty Ship) Artificial Reef, located within Texas state waters in the Gulf of Mexico, approximately 6 miles from Freeport, Brazoria County, Texas. The current reef site is permitted for 160 acres, but only has materials in 40 acres. The 40 acres contain the Vancouver Liberty Ship, an obsolete 441-foot WWII ship (sunk in 1976), as well as additional reef material including quarry rock ( $\geq 1$  ton), concrete culverts, and 100 pyramid structures similar to the proposed pyramids for this project (Figure 8-3). The proposed project would place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 55 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. These improvements would enhance recreational opportunities. The estimated cost for this project is \$2,155,365.



**Figure 8-3. Diagram of the 160-acre Freeport Artificial Reef Project area. The gray triangles indicate the area where concrete pyramids are currently located. The red oval depicts the location and orientation of the Liberty Ship. Other artificial reef materials are currently in the project area within the area designated by the black square.**

### 8.3.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Freeport Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas, which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. This project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a U.S. Army Corps of Engineers (USACE) permit (SWG-2010-00264) for the Freeport Artificial Reef Project under Section 10 of the Rivers and Harbors Act in May 2012. During the permitting process, the Freeport Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program. The USACE permit requires that a 50-meter avoidance zone surrounding the wreck of the George Vancouver be established. TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and avoid impacts to coastal waters. Additionally, the lease requires that the project meet the requirements for clearance and distance from shipping lanes, safety fairways, and anchorages, as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements by the TPWD's Artificial Reef Program (Figure 8-4).



**Figure 8-4. Example of a USCG approved marker buoy.**

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

### **8.3.2 No Action**

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Freeport Artificial Reef Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

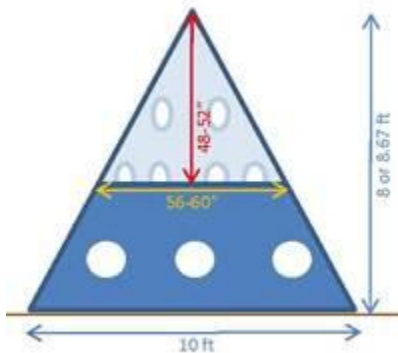
### **8.3.3 Project Location**

The Freeport Artificial Reef Project is located in Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block, Brazos (BA-336). It is located about 6 miles offshore from Brazoria County, Texas at a center point of 28.793009° N, 95.347796° W (North American Datum 1983). The permitted area is 160 acres of sandy substrate at a water depth of 55 feet. The reef site has been permitted for a 33-foot clearance (33 feet of clear water between the surface and any reef material), which allows for a 22-foot profile of material off the ocean bottom.

The location for the Freeport Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.

#### 8.3.4 Construction and Installation

This project would involve deploying approximately 800 to 950 three-sided predesigned concrete pyramids in the project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring. This project would use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure (Figure 8-5). This modification was required by NMFS in order to complete the ESA consultation (NMFS 2014a). Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the designated portion of the 160-acre permitted reef (areas without reef materials).



**Figure 8-5. An example of the predesigned pyramid structures with the open side.**

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed. A GPS antenna would be positioned at the top of the crane boom to monitor the location of the pyramids as they are placed. As the crane cable lowers the pyramid into the water, a buoy attached to the release mechanism on the crane cable will be pushed upward by water pressure (the orange buoy can be seen at the top of the crane cable in Figure 8-6). When the pyramid nears 5 feet from ocean



bottom, the buoy will trigger the release mechanism and the pyramid will drop to the bottom in an upright position.



**Figure 8-6. Photograph of previous artificial reef material deployment completed in Texas.**

It is expected that the pyramids would be transported directly from the manufacturer, and therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Freeport Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the project area is expected to take 4 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the project area.

### **8.3.5 Operations and Maintenance**

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker includes cleaning the chain, replacing the reflective TPWD

decal as needed, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would continue to be managed by the TPWD's Artificial Reef Program.

### **8.3.6 Affected Environment and Environmental Consequences**

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the Freeport Artificial Reef Project area (USACE 2012).<sup>4</sup> The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The following factors were determined to be particularly relevant to this application and were evaluated appropriately, as they relate to the least environmentally damaging practicable alternative described in the alternative analysis section: historical and cultural resources, water quality, endangered species, fish and wildlife values, EFH, wetland/special aquatic species, navigation, federal projects, safety, economics, and air pollution. The USACE considered the following factors during the evaluation process and determined that they were not particularly relevant to the permit application: shoreline erosion and accretion, recreation, aesthetics, land use, conservation, floodplain values, energy needs, food and fiber production, and mineral needs. The EA and SOF found that this project would benefit the Texas state fisheries by providing an augmented natural habitat for juvenile fish, which in turn would increase recreational fisheries.

When considering the overall impacts that would result from this project, in context with the overall impacts from similar past, present, and reasonably foreseeable future projects, the USACE concluded that their cumulative impacts are not considered to be significantly adverse since the project involves the creation of artificial reefs to create habitat for juvenile fish. Overall, the project would result in minimal environmental impacts and minimal impacts on fish and wildlife values.

The USACE added a Special Condition to the permit authorization, requiring establishment of a 50-meter avoidance zone surrounding the wreck of the George Vancouver and prohibiting the placement of reef building material within this avoidance zone.

The USACE determined that there would be no significant environmental effects identified from the proposed work. The impact of this proposed activity on aspects affecting the quality of the human environment was evaluated, and the USACE determined that this action does not require an Environmental Impact Statement. The USACE made the determination to issue a permit for the Freeport Artificial Reef Project, which was issued in May 2012 (SWG-2010-00264).

#### **8.3.6.1 Physical Environment**

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline

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<sup>4</sup> For purposes of the proposed action under NRDA, the EA and SOF do not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF are discussed in this document for informational purposes only.

and the continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

#### 8.3.6.1.1 Geology and Substrates

##### ***Affected Resources***

The Freeport Artificial Reef Project is located on the continental shelf in Texas waters approximately 6 miles off the coast of Brazoria County, Texas. The nearshore deployment of artificial reef material would be implemented within a portion of the 160-acre permitted area that does not currently contain artificial materials. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats.

The nearshore deployment of artificial reef material would be implemented within the permitted area, avoiding areas where there are existing artificial reef materials. In general, the substrate consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

##### ***Environmental Consequences***

The proposed Freeport Artificial Reef Project would be placed on Gulf sediments 55 feet below the surface of the water. Detailed surveys of the ocean bottom have been completed. Any hard outcrops or uneven surfaces identified by the surveys would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor, avoiding existing artificial reef structures and a 164-foot (50-meter) buffer zone surrounding the Vancouver Liberty Ship. Each of the 800 to 950 structures would weigh approximately 6,000 pounds and cover an approximately 43-square foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure resulting in a minor long-term impact. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local project area.

#### 8.3.6.1.2 Hydrology and Water Quality

##### ***Affected Resources***

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005). Although the Mississippi–Atchafalaya River System accounts

for greater than 90% of freshwater discharge into the northern Gulf of Mexico, there are times when the Brazos River is the main source of fresh water to the inner Texas shelf. The Brazos River is the only major Texas river that does not discharge into an embayment system (DiMarco et al. 2012).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

There are no significant currents in the Freeport Artificial Reef Project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 45 feet below the water surface.

#### ***Environmental Consequences***

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. BMPs would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These BMPs along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

#### **8.3.6.1.3 Air Quality and Greenhouse Gas Emissions**

##### ***Affected Resources***

The proposed Freeport Artificial Reef Project area is 6 miles offshore and is not classified for National Ambient Air Quality Standards (NAAQS) criteria pollutants under the Clean Air Act. The nearest county, Brazoria County, which falls within an area the EPA designates as the Houston-Galveston-Brazoria Intrastate Air Quality Control Region (HGB). The HGB is in attainment or unclassified with the NAAQS for all criteria pollutants except ozone. The EPA currently lists the HGB as nonattainment for existing ozone standards.

Implementation of the project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation.

#### ***Environmental Consequences***

The Freeport Artificial Reef Project implementation would require the use of heavy equipment which would temporarily affect air quality in the project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during

transportation and deployment. Any air quality impacts that would occur would be localized and short in duration. After project completion, impact to air quality would be limited to ambient pollutants from boat traffic. Increased boat traffic caused by anglers traveling to the reef could potentially increase air pollution in the vicinity; however, increases in air pollution would still be anticipated to be *de minimis*. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in greenhouse gas (GHG) emissions. Impact minimization measures would be employed to reduce the release of GHG during project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the project:

- Shut down idling construction equipment, if feasible;
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

**Table 8-1. Estimated greenhouse gas impacts.**

EQUIPMENT <sup>5</sup>	NUMBER OF 8-HOUR DAYS	CO <sub>2</sub> (METRIC TONS) <sup>6</sup>	CH <sub>4</sub> (CO <sub>2</sub> e) (METRIC TONS) <sup>7</sup>	NO <sub>x</sub> (CO <sub>2</sub> e ) (METRIC TONS)	TOTAL CO <sub>2</sub> e (METRIC TONS)
Pickup truck	8	1.28	0.001	0.008	1.28
Excavator	8	3.04	0.002	0.016	3.04
Tugboat <sup>8</sup>	4	64.00	0.12	0.48	64.60
Boats (x2)	4	10.40	0.016	0.80	10.48
Crane Barge	4	6.36	0.008	0.044	6.40
Supply Barge	4	5.20	0.008	0.040	5.240
<b>TOTAL</b>		<b>90.28</b>	<b>0.155</b>	<b>0.668</b>	<b>91.04</b>

<sup>5</sup> Emissions assumptions for all equipment based on 8 hours of operation.

<sup>6</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>7</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>8</sup> Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

Based on the assumptions described in the table above, and the small scale and short duration of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

#### 8.3.6.1.4 Noise

##### ***Affected Resources***

Implementation of the Freeport Artificial Reef Project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

##### ***Environmental Consequences***

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate project area would be aware of the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

#### 8.3.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

##### 8.3.6.2.1 Living Coastal and Marine Resources

The Freeport Artificial Reef Project consists of a permitted 160-acre artificial reef area, located approximately 6 miles off the coast of Brazoria County in a water depth of 55 feet. The project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are existing artificial reef materials which would be avoided during project implementation. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

### ***Affected Resources***

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the project area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species including sharks, snapper, grouper, and mackerel can also be found in the project area.

### ***Environmental Consequences***

Fauna in the project area may be affected by the Freeport Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011).

The placement of reef materials on the soft bottom may temporarily increase turbidity in localized areas as sediments are resuspended into the water column. Increased turbidity can affect the use of the project area by juvenile and adult fish as well as adult shrimp species, which are common in the project



area throughout the year. However, the resuspended sediments are expected to settle after each construction day.

Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish, an invasive species, are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper artificial reef site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can.

This project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

#### **8.3.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the U.S. Fish and Wildlife Service (FWS) or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act, and eagles protected under the Bald and Golden Eagle Protection Act. The Freeport Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act. The FWS concurred that the proposed project would not affect federally listed, proposed and candidate species or critical habitats under the jurisdiction of the FWS, or result in take of bald eagles or migratory birds (FWS 2013).

### ***Affected Resources***

#### **Endangered Species**

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Due to the already existing reef structures in the permitted area, endangered or threatened species may utilize the project area as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

There is no designated or proposed critical habitat for any other federally-listed, proposed, or candidate species in the project area.



## Essential Fish Habitat

EFH in the project's area of effect is identified and described for various life stages of 55 managed fish and shellfish (GMFMC 1998). The Freeport Artificial Reef Project is located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

**Table 8-2. EFH within the vicinity of the Freeport Artificial Reef proposed area of effect.**

Species	Life stage(s) Found at Location	Fisheries Management Plan
<b>Highly Migratory Species (HMS)</b>		
Scalloped Hammerhead Shark ( <i>Sphyrna lewini</i> )	All	HMS
Great Hammerhead Shark ( <i>Sphyrna mokarran</i> )	All	HMS
Bull Shark ( <i>Carcharhinus leucas</i> )	All	HMS
Atlantic Sharpnose Shark ( <i>Rhizoprionodon terraenovae</i> )	All	HMS
Bonnethead Shark ( <i>Sphyrna tiburo</i> )	All	HMS
Blacktip Shark ( <i>Carcharhinus limbatus</i> )	All	HMS
Spinner Shark ( <i>Carcharhinus brevipinna</i> )	Neonate, Juvenile	HMS
Lemon Shark ( <i>Negaprion brevirostris</i> )	Neonate, Juvenile	HMS
Finetooth Shark ( <i>Carcharhinus isodon</i> )	All	HMS
Dusky Shark ( <i>Carcharhinus obscurus</i> )	Adult, Juvenile	HMS
Tiger Shark ( <i>Galeocerdo cuvier</i> )	Adult, Juvenile	HMS
<b>Red Drum</b>		
Red Drum ( <i>Sciaenops ocellatus</i> )	Adult	Red Drum
<b>Shrimp</b>		
Brown Shrimp ( <i>Farfantepenaeus aztecus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
White shrimp ( <i>Litopenaeus setiferus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
<b>Coastal Migratory Pelagics</b>		
Cobia ( <i>Rachycentron canadum</i> )	Larvae, Juvenile, Adult, Spawning Adult	Coastal Migratory Pelagics
King Mackerel ( <i>Scomberomorus cavalla</i> )	Juveniles, Adults	Coastal Migratory Pelagics
<b>Reef Fish (Triggerfish, Jacks, Snappers, Groupers)</b>		
Gray triggerfish ( <i>Balistes caprisus</i> )	Eggs, Adults, Spawning Adult	Reef
Greater amberjack ( <i>Seriola dumerili</i> )	Eggs, Larvae, Spawning Adult	Reef
Almaco jack ( <i>Seriola rivoliana</i> )	Eggs, Spawning Adult	Reef
Red snapper ( <i>Lutjanus campechanus</i> )	All	Reef
Gray (mangrove) snapper ( <i>Lutjanus griseus</i> )	Adult, Spawning Adult	Reef
Dog Snapper ( <i>Lutjanus jocu</i> )	Eggs, Larvae, Spawning Adult	Reef
Lane snapper ( <i>Lutjanus synagris</i> )	Eggs, Juvenile, Adult	Reef
Wenchman ( <i>Pristipomoides aquilonaris</i> )	Adult	Reef
Vermilion snapper ( <i>Rhomboplites aurorubens</i> )	Juvenile	Reef
Goliath grouper ( <i>Epinephelus itajara</i> )	Adult	Reef
Gag ( <i>Mycteroperca microlepis</i> )	Adult	Reef

## Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The Freeport Artificial Reef Project area is located within the NOAA-defined nearshore (estuarine waters to the continental shelf edge (depths of 0-656 feet)).

Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 55 feet at the project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 55 feet in the project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian Manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the project area, which is 6 miles offshore. Because the FWS concurred that the project would not affect West Indian manatee under the ESA, the Trustees determined that no take of manatee under the MMPA is anticipated.

### ***Environmental Consequences***

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

At the conclusion of the ESA consultation, NMFS concurred that the project is not likely to adversely affect federally-listed sea turtles (NMFS 2014a). The project area is not located within designated Gulf sturgeon critical habitat (68 FR 13370, March 19, 2003), nor proposed loggerhead sea turtle critical habitat (78 FR 43005, July 18, 2013). As part of the ESA consultation, no best management practices were identified. However, project implementation will adhere to NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions (2006), The Texas Artificial Reef Fishery Management Plan (TPWD 1990), the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NOAA Fisheries 2007).

While most motile fauna such as crab, shrimp, and finfish have the ability to avoid the area during the sinking process, this project will permanently displace a small portion of the existing natural soft bottom and sand habitat within the project area. This project would result in a minor long-term impact to marine soft bottom EFH by covering it with reef pyramid structures and effectively converting the naturally occurring soft bottom to artificial hard bottom substrate. Soft bottom habitat is very abundant in the Gulf of Mexico whereas hard bottom habitat acreage is much more limited. The relative abundance of soft bottom habitat within and surrounding the project area would not be significantly impacted due to the small footprint of each pyramid (10-foot by 10-foot by 10-foot) and the anticipated 20-foot spacing between the pyramids. The conversion from soft bottom habitat to hard bottom substrate would be considered a habitat trade off by providing new hard structures to be colonized by encrusting marine organisms.

NMFS concurred with the EFH assessment for the project, which determined that temporary and localized turbidity impacts and permanent impacts to soft bottom EFH would occur; however, the creation of new hard structure in the Gulf may also create benefits to some species managed under the Magnuson-Stevens Act by providing foraging habitat, cover, and conditions favorable for encrusting benthic colonization (NMFS 2014b).

The Freeport Artificial Reef site is located at a depth of 55 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material and no incidental take of marine mammals is anticipated. Deployment of the reef materials would be short in duration (4 days) and materials would be lowered slowly, providing fish and wildlife opportunity to leave the reef deployment area. Impacts to wildlife would be avoided via management guidelines and techniques as appropriate. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions would be followed (NMFS 2006).

### **8.3.6.3 Human Uses and Socioeconomics**

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

#### **8.3.6.3.1 Socioeconomics and Environmental Justice**

##### ***Affected Resources***

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats

take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen

(<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas pipelines, leases, and an anchorage area within a 5-mile radius of the project. There would be no negative impacts to the exploration and production of oil and gas. The project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area is on the NOAA navigation charts and there is a buoy in the project area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

### ***Environmental Consequences***

Because the Freeport Artificial Reef Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the project. There would be indirect beneficial effects to the local economy due to increased fishing and diving opportunities provided by the artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Freeport Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, and harbor occupancy. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The project would benefit the local economies adjacent to the project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. Commercial fishermen note obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed project. The proposed project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

### **Environmental Justice Analysis**

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding

that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

The Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 6 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed project.

#### 8.3.6.3.2 Cultural Resources

##### ***Affected Resources***

The permitted area has been investigated for Historic Properties as documented in the report titled "Marine Remote-Sensing Survey for Archeological Assessment of the Vancouver Artificial Reef Expansion, Gulf of Mexico, Brazoria County, Texas" (Tubby 2012). The George Vancouver Liberty Ship was previously used as artificial reef material within the permitted area and is considered an historic resource. The ship is the only historic resource that was found and identified within the permit area as a result of the investigation and would be avoided during project implementation. The USACE permit requires that a 50-meter avoidance zone surrounding the wreck of the George Vancouver be established.

##### ***Environmental Consequences***

A detailed archaeology of the entire reef area has been conducted and all areas that could contain historic or culturally important resources would be avoided. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

#### 8.3.6.3.3 Land and Marine Management

##### ***Affected Resources***

The Freeport Artificial Reef Project area is located approximately 6 miles offshore of Brazoria County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2010-00264) for the Freeport Artificial Reef Project under Section 10 of the Rivers and Harbors Act in May 2012. During the permitting process, the Freeport Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program (USACE 2012). The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is consistent with the applicable, enforceable policies of the State's

program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and avoid impacts to coastal waters. Additionally, the lease requires that the project meet the requirements for clearance and distance from shipping lanes, safety fairways, and anchorages, as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Freeport reef site and will be maintained per USCG requirements.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Freeport Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

#### ***Environmental Consequences***

The Freeport Artificial Reef Project would be located offshore, and would not be subject to zoning, land-use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, by following these requirements the project would not have any impacts to the oil and gas production facilities and pipelines in the area of the project. In addition, the project is located greater than 5 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of 33 feet clearance above the reef. Therefore, land and marine management would be unaffected by the Freeport Reef Project.

#### **8.3.6.3.4    Aesthetics and Visual Resources**

##### ***Affected Resources***

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore. The reef is already identified by a buoy with reflective TPWD decals.

##### ***Environmental Consequences***

The use of barges and large equipment could have a temporary visual impact during the time of project implementation. The deployment time would be short in duration, and therefore any visual impacts would be short in duration as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The buoy is already in place, and therefore would not introduce a new

visual component to the area. After completion, visual impacts would be limited to boat traffic. Increased boat traffic caused by anglers traveling to the reef would be consistent with the surroundings or designated uses. The boats would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Therefore, the Freeport Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

#### **8.3.6.3.5 Tourism and Recreational Use**

Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

#### ***Environmental Consequences***

The size of the Freeport Artificial Reef Project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Recreational and commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access point from land is the Freeport Ship Channel to the northeast. The channel is serviced by public boat ramps, marinas, and harbors, which makes the project very accessible to the public. In addition, during scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the enhancement of the Freeport Reef would increase recreational fishing opportunities. In turn, this project is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, and harbor occupancy. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. These economic benefits would be concentrated in the service and retail industry sectors. Anglers would be able to fish around the area during deployment of the pyramids. Therefore, no adverse impacts to tourism and recreational use are anticipated. The project should result in beneficial impacts to tourism and recreational uses over the long term.

#### **8.3.6.3.6 Infrastructure**

##### ***Affected Resources***

The Freeport Artificial Reef Project area is located approximately 6 miles offshore of Brazoria County. The project area is located in 55 feet of water and is permitted for a 33-foot clearance to ensure that it would not impede boat traffic. The project is located less than 5 miles from the Freeport Harbor Anchorage area. The reef area is about 8 miles to the shipping fairway, approximately 5,230 feet to oil and gas pipelines, and about 6 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.



### ***Environmental Consequences***

The project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Navigation occurring in the area would not be adversely affected by this project since the structures would have a minimum 33-foot clearance. Therefore, infrastructure would be unaffected by the proposed project.

#### **8.3.6.3.7 Public Health and Safety and Shoreline Protection**

### ***Affected Resources***

The Freeport Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 6 miles offshore and not in an area that would impact shoreline erosion. The project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels.

### ***Environmental Consequences***

Because of the nature and location of the Freeport Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No adverse effects to public health and safety and shoreline projection are expected as a result of this project.

#### **8.3.7 Summary and Next Steps**

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Freeport Artificial Reef Project would increase the amount of reef materials in an artificial reef site which is currently permitted for 160 acres, but only has materials in 40 acres. The project would place predesigned concrete pyramids in the remaining portions of the permitted area onto sandy substrate at a water depth of 55 feet. The project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).



The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the National Historic Preservation Act and other federal statutes, where appropriate. The Trustees have completed consultations and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Section 10 of the Rivers and Harbors Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.

## 8.4 Matagorda Artificial Reef Project: Project Description

### 8.4.1 Project Summary

The proposed Matagorda Artificial Reef Project will create a new artificial reef site (Outer Continental Shelf Block Brazos BA-439) within Texas state waters in the Gulf of Mexico, approximately 10 miles offshore of Matagorda County, Texas (Figure 8-7). The proposed project will create a new artificial reef within the 160-acre permitted area, through deployment of predesigned concrete pyramids onto sandy substrate at a water depth of 60 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. This project would enhance recreational fishing opportunities. The estimated cost for this project is \$3,552,398, which includes an increase of \$66,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.<sup>9</sup>



**Figure 8-7. Location of the proposed Matagorda Reef Project.**

<sup>9</sup> In Texas, the estimated costs of artificial reef projects increased by \$200,000, a less than 3% increase, to cover marine archaeological and environmental compliance requirements for three of the artificial reef sites.

#### 8.4.2 Background and Project Description

The purpose of the Matagorda Artificial Reef Project is to enhance recreational fishing opportunities (and limited diving opportunities since water clarity is not usually conducive for diving) for Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and divers to provide a significant fiscal boost to local economies.

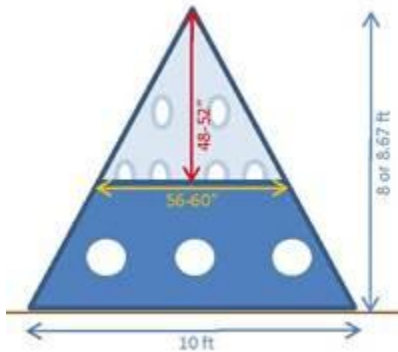
The proposed project will create a new artificial reef located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Brazos (BA-439). The project area is 160 acres of barren, sandy substrate at a water depth of 60 feet, about 10 miles offshore of Matagorda County, Texas.

The location for the Matagorda Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD's Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs.

The Texas Sea Grant Extension Service and the Matagorda County local government were consulted for several years before TPWD applied for the reef site permit in 2009. The Texas Sea Grant Extension Service engaged in extensive communication with local fishermen (recreational and commercial), divers, the general public, and local government to assist in developing a local reef site that would enhance marine habitat, provide additional angling opportunities, and strengthen the local economy. The Matagorda reef location was approved after further discussion with the Matagorda County officials and verification that the site adhered to guidance provided in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan (USACE 2010). The TPWD Coastal Resource Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides easy access for the local community, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending to benefit the local economy.

The Matagorda Artificial Reef Project will create a new reef by deploying 1,600 predesigned concrete pyramids randomly within the 160-acre project area. Texas' artificial reefs are generally created and placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent

settling and scouring. This project will use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure (Figure 8-8). This modification was required by NMFS in order to complete the ESA consultation (NMFS 2014a). Each pyramid should penetrate the substrate by no more than 2 feet.



**Figure 8-8. An example of the predesigned pyramid structures with the open side.**

#### 8.4.3 Evaluation Criteria

This proposed project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Matagorda Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The project would enhance opportunities for public use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible, utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Matagorda Artificial Reef Project meets the requirements of the

Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The Matagorda County local government, the Texas Sea Grant Service, local fishermen, divers, and the public provided input into the selection of the reef site. As a result, the proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.4. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the BMPs and measures to avoid or minimize impacts described in Section 8.4 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

#### **8.4.4 Performance Criteria, Monitoring and Maintenance**

The Matagorda Artificial Reef Project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to create an artificial reef through the random placement of 1,600 predesigned concrete pyramids within the permitted artificial reef site (BA-439).

Performance criteria for this project will include a determination of successful construction of the project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

While not funded through Early Restoration, recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A buoy waiver was received from USCG so buoy maintenance is not expected for the Matagorda Reef Project. The reef site is not located in a high traffic area and therefore no adverse impacts are expected by not marking the site with a buoy. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

#### 8.4.5 Offsets

The Early Restoration benefits provided by the project, also known as NRD Offsets, are \$7,104,796<sup>10</sup> expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill<sup>11</sup>. This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

#### 8.4.6 Cost

The total estimated cost to implement this Matagorda Artificial Reef Project is \$3,552,398, which includes an increase of \$66,000 over the original estimated cost to complete unanticipated marine archaeological environmental compliance requirements. This cost reflects estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

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<sup>10</sup> The NRD Offset has been updated from the Draft Phase III ERP/PEIS to reflect the increased cost for completing the marine archaeological environmental compliance requirements.

<sup>11</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

## 8.5 Matagorda Artificial Reef Project: Environmental Review

The proposed Matagorda Artificial Reef Project would create a new artificial reef site (Outer Continental Shelf Block Brazos BA-439) within Texas state waters in the Gulf of Mexico, approximately 10 miles offshore of Matagorda County, Texas. The proposed project would create an artificial reef within the 160-acre permitted area, through deployment of predesigned concrete pyramids onto sandy substrate at a water depth of 60 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. This project would enhance recreational fishing opportunities. The estimated cost for this project is \$3,552,398, which includes an increase of \$66,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.

### 8.5.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Matagorda Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. There are no other artificial reef areas in state waters offshore of Matagorda County, Texas. This project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and have found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a USACE permit (SWG-2009-01139) for the Matagorda Artificial Reef Project under Section 10 of the Rivers and Harbors Act in December 2010. During the permitting process, the Matagorda Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program (USACE 2010).

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels,



and avoid impacts to coastal waters. Additionally, the lease requires that the project meet the requirements for clearance and distance from shipping lanes, safety fairways, and anchorages, as established by the USACE and the USCG. The USCG reviewed the project and determined that private aids to navigation are not required for this project.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NOAA Fisheries 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Matagorda Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

#### **8.5.2 No Action**

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Matagorda Artificial Reef Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

#### **8.5.3 Project Location**

The Matagorda Artificial Reef Project is located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block, Brazos (BA-439). The project is located about 10 miles offshore from Matagorda County, Texas and 17 miles from the mouth of the Colorado River at a center point of 28.516972° N, 95.781252° W (North American Datum 1983). The permitted area is 160 acres of sandy substrate at a water depth of 60 feet. The reef site has been permitted for a 50-foot clearance (50 feet of clear water between the surface and any reef material), which allows for a 10-foot profile of material off the ocean bottom.

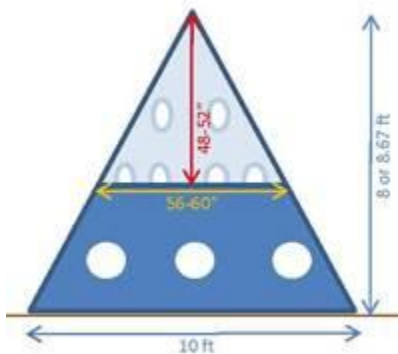
The location for the Matagorda Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.



The project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The public, Matagorda County local government, the Texas Sea Grant Service, local fishermen and divers provided input into the selection of the reef site. The TPWD developed the Texas Artificial Reef Fishery Management Plan (TPWD 1990) which guides the decision-making process for selecting reef sites and materials and defines parameters for prioritizing areas for reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process.

#### 8.5.4 Construction and Installation

Surveys of the project were conducted in December 2013 to identify potential hard bottom substrates and cultural resources. This project would create a new reef by deploying approximately 1,600 predesigned concrete pyramids in the project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring. This project would use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure (Figure 8-9). This modification was required by NMFS in order to complete the Endangered Species Act consultation (NMFS 2014a). Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the 160-acre permitted reef site.



**Figure 8-9. An example of the predesigned pyramid structures with the open side.**

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed. A GPS antenna would be positioned at the top of the crane boom to monitor the location of

the pyramids as they are placed. As the crane cable lowers the pyramid into the water, a buoy attached to the release mechanism on the crane cable will be pushed upward by water pressure (the orange buoy can be seen at the top of the crane cable in Figure 8-10). When the pyramid nears 5 feet from ocean bottom, the buoy will trigger the release mechanism and the pyramid will drop to the bottom in an up-right position.



**Figure 8-10. Photograph of previous artificial reef material deployment completed in Texas.**

It is expected that the pyramids would be transported directly from the manufacturer, and therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Matagorda Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the project area is expected to take 10 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the project area.

#### **8.5.5 Operations and Maintenance**

No ongoing maintenance beyond the annual surveys is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A buoy waiver was received from the USCG, so buoy maintenance is not expected for the Matagorda Reef Project. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

### 8.5.6 Affected Environment and Environmental Consequences

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the project area (USACE 2010).<sup>12</sup> The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The EA and SOF found:

- The project will result in the creation of an artificial reef that will augment natural fisheries habitat for juvenile reef fish for the benefit of the public;
- There are no existing natural reefs located within the project site;
- Construction of the reef will enhance the fish and wildlife values of the site;
- Sport and recreational fishing will be enhanced in the area; and
- There will be minimal cumulative environmental impacts from this project.

In the conclusion of the EA and SOF, the USACE made the determination to issue a permit for the Matagorda Reef Project, which was issued in December 2010 (SWG 2009-001139).

#### 8.5.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

##### 8.5.6.1.1 Geology and Substrates

###### ***Affected Resources***

The Matagorda Artificial Reef Project is located on the continental shelf in Texas waters approximately 10 miles off the coast of Matagorda County, Texas. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats. The nearshore deployment of artificial reef material would be implemented within a permitted area that does not contain existing artificial materials. The project area covers 160 acres of flat to gently sloping soft, thick

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<sup>12</sup> For purposes of the proposed action under NRDA, the EA and SOF do not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF are discussed in this document for informational purposes only.

bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

### ***Environmental Consequences***

The proposed project would be placed on Gulf sediments 60 feet below the surface of the water. Prior to reef construction, a survey of the project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor. Each of the 1,600 structures would weigh approximately 6,000 pounds and cover approximately 43 square-foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure resulting in a minor long-term impact. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local project area.

#### **8.5.6.1.2 Hydrology and Water Quality**

### ***Affected Resources***

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

There are no significant currents in the project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 50 feet below the water surface.

### ***Environmental Consequences***

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. BMPs would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These BMPs along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly

dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

#### 8.5.6.1.3 Air Quality and Greenhouse Gas Emissions

##### ***Affected Resources***

The proposed Matagorda Artificial Reef Project area is 10 miles offshore and is not classified for NAAQS criteria pollutants under the Clean Air Act. The nearest county, Matagorda County, is not listed as a nonattainment area for any pollutant by the EPA.

Implementation of the project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation.

##### ***Environmental Consequences***

Matagorda Artificial Reef Project implementation would require the use of heavy equipment which would temporarily affect air quality in the project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during transportation and deployment. Any air quality impacts that would occur would be localized and short in duration. After project completion, impact to air quality would be limited to ambient pollutants from boat traffic. Increased boat traffic caused by anglers traveling to the reef could potentially increase air pollution in the vicinity; however, increases in air pollution would still be anticipated to be *de minimis*. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the project:

- Shut down idling construction equipment, if feasible;
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

**Table 8-3. Estimated greenhouse gas impacts.**

EQUIPMENT <sup>13</sup>	NUMBER OF 8-HOUR DAYS	CO <sub>2</sub> (METRIC TONS) <sup>14</sup>	CH <sub>4</sub> (CO <sub>2</sub> e) (METRIC TONS) <sup>15</sup>	NO <sub>x</sub> (CO <sub>2</sub> e ) (METRIC TONS)	TOTAL CO <sub>2</sub> e (METRIC TONS)
Pickup truck <sup>16</sup>	10	1.60	0.001	0.01	1.6
Excavator	10	3.80	0.002	0.02	3.8
Boats (x2)	10	26.00	0.040	0.20	26.2
Tugboat <sup>17</sup>	10	160.00	0.30	1.2	161.5
Crane Barge	10	15.90	0.021	0.11	16.0
Supply Barge	10	13.00	0.020	0.10	13.1
<b>TOTAL</b>		<b>220.30</b>	<b>0.384</b>	<b>1.64</b>	<b>222.2</b>

Based on the assumptions described in the table above, and the small scale and short duration of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

#### 8.5.6.1.4 Noise

##### ***Affected Resources***

Implementation of the Matagorda Artificial Reef Project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

##### ***Environmental Consequences***

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate project area would be aware of the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however,

<sup>13</sup> Emissions assumptions for all equipment based on 8 hours of operation.

<sup>14</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>15</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>16</sup> Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

<sup>17</sup> Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating, personal vehicle use, and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

#### **8.5.6.2 Biological Environment**

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

##### **8.5.6.2.1 Living Coastal and Marine Resources**

The Matagorda Artificial Reef Project consists of a permitted 160 acre artificial reef area, located approximately 10 miles off the coast of Matagorda County in a water depth of 60 feet. The project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are no existing artificial reef materials in the project site. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

#### ***Affected Resources***

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the project Area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.



Many fish species including sharks, snapper, grouper, and mackerel can also be found in the project area.

### ***Environmental Consequences***

Fauna in the project area may be affected by the Matagorda Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials will provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011).

The placement of reef materials on the soft bottom may temporarily increase turbidity in localized areas as sediments are resuspended into the water column. Increased turbidity can affect the use of the project area by juvenile and adult fish as well as adult shrimp species, which are common in the project area throughout the year. However, the resuspended sediments are expected to settle after each construction day.

Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish, an invasive species, are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper artificial reef site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can.

This project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

#### **8.5.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the FWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, EFH protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act. The Matagorda

Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act. The FWS concurred that the project would not affect federally listed, proposed and candidate species or critical habitats under the jurisdiction of the FWS, or result in take of bald eagles or migratory birds (FWS 2013).

### ***Affected Resources***

#### **Endangered Species**

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Since there are currently no artificial reef structures in the permitted area, no endangered or threatened species are likely to be utilizing the project area at the time of project implementation as habitat for foraging, breeding, or resting. The project area has not been designated as critical habitat for any of the sea turtle species.

There is no designated or proposed critical habitat for any other federally-listed, proposed, or candidate species in the project area.

#### **Essential Fish Habitat**

EFH in the project's area of effect is identified and described for various life stages of 55 managed fish and shellfish (GMFMC 1998). The Matagorda Artificial Reef Project is located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

**Table 8-4. EFH within the vicinity of the Matagorda Artificial Reef proposed area of effect.**

Species	Life stage(s) Found at Location	Fisheries Management Plan
<b>Highly Migratory Species (HMS)</b>		
Scalloped Hammerhead Shark ( <i>Sphyrna lewini</i> )	All	HMS
Great Hammerhead Shark ( <i>Sphyrna mokarran</i> )	All	HMS
Bull Shark ( <i>Carcharhinus leucas</i> )	All	HMS
Atlantic Sharpnose Shark ( <i>Rhizoprionodon terraenovae</i> )	All	HMS
Bonnethead Shark ( <i>Sphyrna tiburo</i> )	All	HMS
Blacktip Shark ( <i>Carcharhinus limbatus</i> )	All	HMS
Spinner Shark ( <i>Carcharhinus brevipinna</i> )	Neonate, Juvenile	HMS
Lemon Shark ( <i>Negaprion brevirostris</i> )	Neonate, Juvenile	HMS
Finetooth Shark ( <i>Carcharhinus isodon</i> )	All	HMS
Dusky Shark ( <i>Carcharhinus obscurus</i> )	Adult, Juvenile	HMS
Tiger Shark ( <i>Galeocerdo cuvier</i> )	Adult, Juvenile	HMS
<b>Red Drum</b>		
Red Drum ( <i>Sciaenops ocellatus</i> )	Adult	Red Drum
<b>Shrimp</b>		
Brown Shrimp ( <i>Farfantepenaeus aztecus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
White shrimp ( <i>Litopenaeus setiferus</i> )	Eggs, Larvae, Adult, Spawning	Shrimp

Species	Life stage(s) Found at Location	Fisheries Management Plan
	Adult	
Pink shrimp ( <i>Litopenaeus duararum</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
<b>Coastal Migratory Pelagics</b>		
Cobia ( <i>Rachycentron canadum</i> )	Larvae, Juvenile, Adult, Spawning Adult	Coastal Migratory Pelagics
<b>Reef Fish (Triggerfish, Jacks, Snappers, Groupers)</b>		
Gray triggerfish ( <i>Balistes caprisus</i> )	Eggs, Adults, Spawning Adult	Reef
Greater amberjack ( <i>Seriola dumerili</i> )	Eggs, Larvae, Spawning Adult	Reef
Almaco jack ( <i>Seriola rivoliana</i> )	Eggs, Spawning Adult	Reef
Red snapper ( <i>Lutjanus campechanus</i> )	All	Reef
Gray (mangrove) snapper ( <i>Lutjanus griseus</i> )	Adult, Spawning Adult	Reef
Lane snapper ( <i>Lutjanus synagris</i> )	Eggs, Adult	Reef
Wenchman ( <i>Pristipomoides aquilonaris</i> )	Adult	Reef
Vermilion snapper ( <i>Rhomboplites aurorubens</i> )	Juvenile	Reef
Goliath grouper ( <i>Epinephelus itajara</i> )	Adult	Reef
Yellowmouth grouper ( <i>Mycteroperca interstitialis</i> )	Eggs, Larvae, Adult	Reef
Gag ( <i>Mycteroperca microlepis</i> )	Adult	Reef

### Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 60 feet at the project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 60 feet in the project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the project area, which is 10 miles offshore. Because the FWS concurred that the project would not affect West Indian manatee under the ESA, the Trustees determined that no take of manatee under the MMPA would occur.

### ***Environmental Consequences***

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles, such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

At the conclusion of the ESA consultation, NMFS concurred that the project is not likely to adversely affect federally-listed sea turtles (NMFS 2014a). The project area is not located within designated Gulf sturgeon critical habitat (68 FR 13370, March 19, 2003), nor proposed loggerhead sea turtle critical habitat (78 FR 43005, July 18, 2013). As part of the Endangered Species Act consultation, no best management practices were identified. However, project implementation will adhere to NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions (2006), The Texas Artificial Reef Fishery Management Plan (TPWD 1990), the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NOAA Fisheries 2007).

While most motile fauna such as crab, shrimp, and finfish have the ability to avoid the area during the sinking process, this project will permanently displace a small portion of the existing natural soft bottom and sand habitat within the project area. This project would result in a minor long-term impact to marine soft bottom EFH by covering it with reef pyramid structures and effectively converting the naturally occurring soft bottom to artificial hard bottom substrate. Soft bottom habitat is very abundant in the Gulf of Mexico whereas hard bottom habitat acreage is much more limited. The relative abundance of soft bottom habitat within and surrounding the project area would not be significantly impacted due to the small footprint of each pyramid (10-foot by 10-foot by 10-foot) and the anticipated 20-foot spacing between the pyramids. The conversion from soft bottom habitat to hard bottom substrate would be considered a habitat trade off by providing new hard structures to be colonized by encrusting marine organisms.

NMFS concurred with the EFH assessment for the project, which determined that temporary and localized turbidity impacts and permanent impacts to soft bottom EFH would occur; however, the creation of new hard structure in the Gulf may also create benefits to some species managed under the Magnuson-Stevens Act by providing foraging habitat, cover, and conditions favorable for encrusting benthic colonization (NMFS 2014c).

The Matagorda Artificial Reef site is located at a depth of 60 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material and no incidental take of marine mammals is anticipated. Deployment of the reef materials would be short in duration (10 days) and materials would be lowered slowly, providing wildlife opportunity to leave the reef deployment area. Impacts to would be avoided via management guidelines and techniques. During reef deployment, a

monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions would be followed (NMFS 2006).

### 8.5.6.3 Human Uses and Socioeconomics

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

#### 8.5.6.3.1 Socioeconomics and Environmental Justice

##### ***Affected Resources***

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen (<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas platforms, leases, and pipelines within a 5-mile radius of the project; however, there would be no negative impacts to the exploration and production of oil and gas. The Matagorda Artificial Reef Project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

##### ***Environmental Consequences***

Because this project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Matagorda Artificial Reef Project. There would be indirect beneficial effects to the local economy due to increased fishing opportunities provided by the

artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Matagorda Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of items such as bait and supplies, boat launch fee revenue, harbor occupancy, and fuel. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The project would benefit the local economies adjacent to the project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. It is expected the commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed project. The project is expected to provide a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

### ***Environmental Justice Analysis***

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population.

The Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 10 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed project.

### **8.5.6.3.2 Cultural Resources**

#### ***Affected Resources***

There are no known historic or prehistoric sites in the permitted reef area. A high-resolution geophysical survey was conducted in December 2013 to ensure that no historically or culturally significant areas would be impacted during the deployment of the artificial reef materials. The data collected during the survey was assessed for evidence of high probability areas for prehistoric occupations and shipwrecks. The evaluation of the high-resolution geophysical survey data from a survey conducted within the project area indicates that there were no landforms identified within the survey area that could be considered as high probability areas for prehistoric occupations. There were no sonar contacts identified within the survey area. Three unidentified magnetic anomalies were recorded that are low amplitude, short duration, isolated anomalies that do not exhibit characteristic features usually associated with shipwreck locations. The three unidentified magnetic anomalies are interpreted as probable modern debris. There were no other unusual depressions, scours, sediment changes,

unidentified magnetic anomalies or unidentified seafloor targets observed within the survey area that could represent unidentified shipwreck remains.

### ***Environmental Consequences***

It is possible that historic shipwreck materials may not be detected by the geophysical instruments or may be obscured by modern debris. If wooden planking or other cultural materials that could represent shipwreck remains are encountered, field operations would cease and a representative from the Texas Historical Commission would be contacted to provide further guidance. If any culturally or historically important resources are identified during project preparations or pre-deployment surveys, such areas would be avoided during deployment of the pyramid structures. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

### **8.5.6.3.3 Land and Marine Management**

#### ***Affected Resources***

The project area is located approximately 10 miles offshore of Matagorda County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2009-01139) for the Matagorda Artificial Reef Project under Section 10 of the Rivers and Harbors Act in December 2010. During the permitting process, the Matagorda Artificial Reef Project was determined to be consistent with the goals and policies of the Texas Coastal Management Program (USACE 2010). The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the project meet the requirements for clearance and distance from shipping lanes, safety fairways, and anchorages, as established by the USACE and the USCG. The USCG reviewed the project and determined that a buoy is not required for this project.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating



Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Matagorda Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

#### ***Environmental Consequences***

The Matagorda Artificial Reef Project would be located offshore, and would not be subject to zoning, land-use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, by following these requirements the project would not have any impacts to the oil and gas production facilities and pipelines in the area of the project. In addition, the project is located greater than 5 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of 50 feet clearance above the reef. Thus, the project would not adversely impact shipping and navigation use in the project area, and would be consistent with current uses. Therefore, land and marine management would be unaffected by the Matagorda Reef Project.

#### **8.5.6.3.4   Aesthetics and Visual Resources**

##### ***Affected Resources***

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore.

##### ***Environmental Consequences***

The use of barges and large equipment could have a temporary visual impact during the time of project implementation. The deployment time would be short in duration and therefore any visual impacts would be short in duration as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. After completion, visual impacts would be limited to boat traffic. Increased boat traffic caused by anglers traveling to the reef would be consistent with the surroundings or designated uses. The boats would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Therefore, the Matagorda Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

#### **8.5.6.3.5   Tourism and Recreational Use**

##### ***Affected Resources***

Currently an artificial reef does not exist in the area. According to TPWD data, artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

### ***Environmental Consequences***

The size of the project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Because the Matagorda Artificial Reef Project is not placing materials near an existing artificial reef, it would not have any impacts on existing recreational reef fishing in the area. Though unlikely, it is possible that recreational and/or commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access points from land include Freeport Ship Channel to the northeast, the Colorado River Channel to the northwest and Matagorda Channel to the south. Each channel is serviced by public boat ramps, marinas, and harbors, which makes the project very accessible to the public. In addition, during scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the construction of the Matagorda reef would increase recreational fishing opportunities. In turn, this project is anticipated to increase sales of bait and supplies, boat launch fee revenue, and harbor occupancy. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Anglers would be able to fish around the area during deployment of the pyramids. Therefore, no adverse impacts to tourism and recreational use are anticipated. The project should result in beneficial impacts to tourism and recreational uses over the long-term.

#### **8.5.6.3.6 Infrastructure**

### ***Affected Resources***

The project area is located approximately 10 miles offshore of Matagorda County. The project area is located in 60 feet of water and is permitted for a 50-foot clearance to ensure that it would not impede boat traffic. The project is located about 21 miles from the Matagorda Channel Anchorage area. The reef area is about 8 miles to the shipping fairway, approximately 5,230 feet to oil and gas pipelines, and about 2 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.

### ***Environmental Consequences***

The Matagorda Artificial Reef Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Therefore, infrastructure would be unaffected by this project.

#### **8.5.6.3.7 Public Health and Safety and Shoreline Protection**

### ***Affected Resources***

The Matagorda Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 10 miles offshore and not in an area that

would impact shoreline erosion. The project deployment would use mechanical equipment and marine vessels that use oil, lubricants, and fuels.

### ***Environmental Consequences***

Because of the nature and location of the Matagorda Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release will be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No adverse effects to public health and safety and shoreline projection are expected as a result of this project.

### **8.5.7 Summary and Next Steps**

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Matagorda Artificial Reef Project would create a new artificial reef site approximately 10 miles offshore of Matagorda County, Texas. It would create an artificial reef within the 160-acre permitted area, through deployment of predesigned concrete pyramids. The project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the National Historic Preservation Act and other federal statutes, where appropriate. The Trustees have completed consultations and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Section 10 of the Rivers and Harbors Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including

ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.

## 8.6 Mid/Upper Texas Coast Artificial Reef - Ship Reef Project: Project Description

### 8.6.1 Project Summary

The proposed Ship Reef Project will create a new artificial reef site (Outer Continental Shelf Block High Island HI-A-424) in deep waters of the Gulf of Mexico, about 67 miles south-southeast of Galveston, Texas (Figure 8-11). The proposed project will create an artificial reef by sinking a ship that is at least 200 feet long within the 80-acre permitted reef site, in waters that are approximately 135 feet deep. The ship will be cleaned of hazardous substances to meet EPA criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. The project would enhance recreational fishing and diving opportunities. This Early Restoration project proposal would fund a portion of the costs to implement this project. The estimated cost for the NRD Early Restoration portion of this project is \$1,919,765 which includes an increase of \$134,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.<sup>18</sup> Additional funds from donations to the TPWD Texas Artificial Reef Program will be used to complete the project.



**Figure 8-11. Location of the proposed Ship Reef Project.**

<sup>18</sup> In Texas, the estimated costs of artificial reef projects increased by \$200,000, a less than 3% increase, to cover marine archaeological and environmental compliance requirements for three of the artificial reef sites.

### 8.6.2 Background and Project Description

The purpose of the Ship Reef Project is to enhance recreational fishing and diving opportunities for Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide a significant fiscal boost to local economies.

The proposed project will create a new artificial reef in the Gulf of Mexico in the Outer Continental Shelf Block High Island (HI-A-424). The permitted area is located approximately 67 miles offshore from Galveston, Texas in about 135 feet of water. The project area covers 80 acres of what is believed to be barren, sandy substrate along the continental shelf. An archaeology / bottom survey is currently being contracted to characterize and survey the bottom at this reef site.

The location for the Ship Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD's Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007), and National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs (EPA and MARAD 2006) when creating artificial reefs. The 80-acre ship reef project area was selected after an evaluation of 35 permitted reef sites in the TPWD General Permit Zone in the High Island Outer Continental Shelf Block of the Gulf of Mexico. High Island 424 (HI-A-424) was selected after consideration of numerous factors, including water depth, proximity to other reef sites, proximity to shipping lanes, navigational concerns, buoy marking requirements, proximity to the Flower Garden Banks National Marine Sanctuary, potential user conflicts, interference with future petroleum operations, and constituency desires.

Texas will acquire and sink a ship that is at least 200 feet long in waters that are approximately 135 feet deep. The ship will be cleaned of hazardous substances to meet EPA criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. This project will support the recreational fisherman and divers in Texas by adding structure that will attract reef fish, and preserve the nautical heritage of the ship (Figure 8-12).



**Figure 8-12. Example of a ship that was used to create an artificial reef in Texas.**

The addition of a ship reef off of the northern coast of Texas has wide support from divers, anglers, fisheries managers, the public, and local governments. Ships are constructed of durable and stable material and once sunk, form complex habitats for attracting marine life, provide recreational opportunities for divers and anglers, and generate economic returns to local communities. The diving community has expressed interest in a ship reef that is designed specifically for diving. The TPWD's Artificial Reef Program recently received a petition of support for a ship reef project from the Texas Gulf Council of Diving Clubs with over 500 diver signatures.

### **8.6.3 Evaluation Criteria**

This proposed Ship Reef Project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Ship Reef Project is intended to enhance recreational fishing and diving opportunities in the Gulf of Mexico offshore of Texas. This proposed ship reef will benefit anglers and divers by creating additional habitat to attract a high diversity of reef species in an area that has good visibility for recreational diving activities. The project would enhance opportunities for public use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

This project area was chosen for placement of a ship artificial reef, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites.



All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. The creation of a ship reef off the northern coast of Texas has received wide support from divers, anglers, fisheries managers, the public, and local governments. As a result, the proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)). While the Trustees believe this to be a technically feasible project, should the Ship Reef Project become technically infeasible (e.g., due to a lack of appropriate ship options), the Trustees have also proposed as an alternate project an artificial reef project within Texas state waters (the Corpus Artificial Reef Project) in which predesigned pyramid reef structures will be deployed.

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.6. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the BMPs and measures to avoid or minimize impacts described in Section 8.6 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation, operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

#### **8.6.4 Performance Criteria, Monitoring and Maintenance**

This Ship Reef Project includes monitoring efforts to ensure project methods are correctly implemented during implementation. Monitoring has been designed around the project objective, which is to create an artificial reef through the sinking of a ship within the permitted artificial reef site (HI-A-424).

Performance criteria for this project will include a determination of successful construction of the project according to design, and then monitoring and maintenance to confirm that the ship is in place and available for recreational fishing and diving. In order to determine successful placement of the ship according to design plans, multi-beam side-scan surveys and/or divers will verify final location and orientation of the ship before and after project implementation. The post-implementation survey will also be used to confirm that the final project meets all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar and/or divers will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the ship. Recreational use of the reef observed during the annual monitoring will also be documented.

While not funded through Early Restoration, recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs

and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A lighted buoy, as required by the USCG, would be installed within the reef area. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. The TPWD Artificial Reef Program currently has a buoy maintenance contract in place for other reef sites. This buoy would be added to the current contract. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

#### 8.6.5 Offsets

The Early Restoration benefits provided by the project, also known as NRD Offsets, are \$3,839,530<sup>19</sup> expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill.<sup>20</sup> This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to the NRD Early Restoration portion of its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

#### 8.6.6 Cost

The total estimated cost to implement the Ship Reef Project is estimated to be \$4 million. The estimated cost for the NRD Early Restoration portion of this project is \$1,919,765 which includes an increase of \$134,000 over the original estimated cost to complete marine archaeological environmental compliance requirements<sup>21</sup>. Additional funds would come from donations to the TPWD's Artificial Reef Program. This cost reflects estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

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<sup>19</sup> The NRD Offset has been updated from the Draft Phase III ERP/PEIS to reflect the increased cost for completing the marine archaeological environmental compliance requirements.

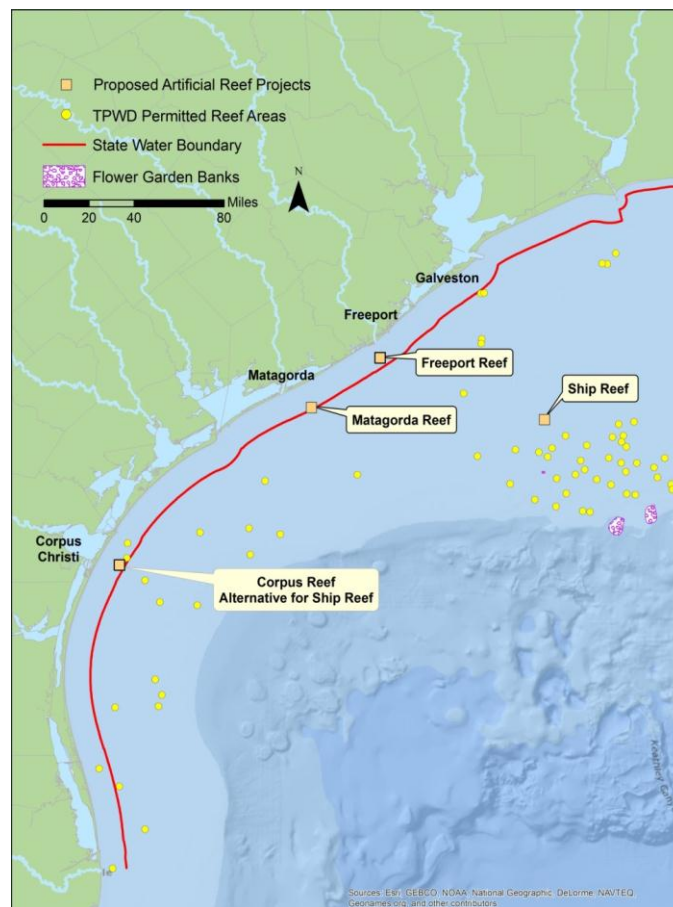
<sup>20</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

<sup>21</sup> In Texas, the estimated costs of artificial reef projects increased by \$200,000, a less than 3% increase, to cover marine archaeological and environmental compliance requirements for three of the artificial reef sites.

## 8.7 Mid/Upper Texas Coast Artificial Reef - Ship Reef Project: Environmental Review

The proposed Ship Reef Project would create a new artificial reef site (Outer Continental Shelf Block High Island HI-A-424) in deep waters of the Gulf of Mexico, approximately 67 miles south-southeast of Galveston, Texas (Figure 8-13). The proposed project would create an artificial reef by sinking a ship that is at least 200 feet long within the 80-acre permitted reef site, in water about 135 feet deep. The ship would be cleaned of hazardous substances to meet EPA criteria, as well as pass all required Federal and State inspections, including EPA, TPWD, and USCG. The Ship Reef Project would enhance recreational fishing and diving opportunities. The total estimated cost to implement the Ship Reef Project is estimated to be \$4 million. The estimated cost for the NRD Early Restoration portion of this project is \$1,919,765 which includes an increase of \$134,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.<sup>22</sup> Additional funds would come from donations to the TPWD's Artificial Reef Program.



**Figure 8-13. Location of the Ship Reef Project and other artificial reef locations along the Texas coast in the Gulf of Mexico.**

<sup>22</sup> In Texas, the estimated costs of artificial reef projects increased by \$200,000, a less than 3% increase, to cover marine archaeological and environmental compliance requirements for three of the artificial reef sites.

### 8.7.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the spill, including recreational fishing and diving, beach use, camping, diving, and wildlife viewing. This project is intended to enhance recreational fishing and diving opportunities by creating artificial reef habitat through the sinking of a ship in clear offshore waters.

The diving community has expressed interest in a ship reef that is designed specifically for diving. Sinking a ship in clear offshore waters that are appropriate for diving would alleviate a need for additional reef diving and fishing activities by Texas patrons. This project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

The addition of a ship reef off of the northern coast of Texas has wide support from divers, anglers, fisheries managers, the public and local governments. Ships are constructed of durable and stable material and form complex habitats for attracting marine life, provide recreational opportunities for divers and anglers, and generate economic returns to local communities. The diving community has expressed interest in a ship reef that is designed specifically for diving. The TPWD's Artificial Reef Program recently received a petition of support for a ship reef project from the Texas Gulf Council of Diving Clubs with over 500 signatures. The Ship Reef Project was chosen to be appropriate, in part, because of public support for the site.

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a USACE permit (SWG-2013-00249) for the Ship Reef Project under Section 10 of the Rivers and Harbors Act in March 2014. The permit requires that the project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. The USCG has conducted a preliminary review of this project and has approved a 60-foot clearance. A lighted buoy would be required.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and

Gulf States Marine Fisheries Commissions 2004), the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007), and National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs (EPA and MARAD 2006) when creating artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan. While the Trustees believe this to be a technically feasible project, should the Ship Reef Project become technically infeasible (e.g., due to a lack of appropriate ship options), the Trustees have also proposed an artificial reef project within Texas state waters (the Corpus Reef Project) in which predesigned pyramid reef structures would be deployed.

#### **8.7.2 No Action**

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Ship Reef Project or the Corpus Artificial Reef Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

#### **8.7.3 Project Location**

The Ship Reef Project is located in the Outer Continental Shelf Block High Island (HI-A-424) of the Gulf of Mexico. The site is approximately 67 miles south-southeast of Galveston, Texas in federal waters at a center point of 28.444008° N, 94.285044° W (North American Datum of 1983). The reef site is 80 acres and the water depth is approximately 135 feet. The reef site is anticipated to be permitted for a 60-foot clearance (60 feet of clear water between the surface and the ship), which allows for a 75-foot profile of material off the ocean bottom.

The location for the Ship Reef Project was identified in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates. The 80 acre Ship Reef Project area was selected after an evaluation of 35 permitted reef sites in the TPWD General Permit Zone in the High Island Outer Continental Shelf Block of the Gulf of Mexico. High Island 424 (HI-A-424) was selected after consideration of numerous factors, including water depth, proximity to other reef sites, proximity to shipping lanes, navigational concerns, buoy marking requirements, proximity to the Flower Garden Banks National Marine Sanctuary, potential user conflicts, interference with future petroleum operations, and constituency desires.

#### 8.7.4 Construction and Installation

Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i.e. coral reefs, rock outcrops, etc.). Surveys of the project area were conducted in November 2013 to identify potential hard bottom substrates and cultural resources.

TPWD would acquire a ship that is at least 200 feet long, visually complex and interesting for divers, and is able to be properly cleaned, modified and sunk. It is estimated that the surface area on the keel of the ship would be 12,500 square feet, which would cover less than 1% of the permitted 80 acres. That leaves sufficient space for other materials to be reefed at a later date if desired. Prior to sinking, the ship would be cleaned and would undergo modifications to meet clearance and safety requirements. Once the ship has been acquired, the exact method of cleanup, hull modification, and sinking would be determined. The final sinking plan would be adapted in coordination with the USCG to ensure safety of personnel participating and/or observing the sinking. The sinking plan details the explosives plan that would be used to overcome buoyancy and “drive” the ship to the bottom quickly and evenly. The use of explosives is necessary to avoid the effects of surface winds and uneven flooding which could cause the ship to list during sinking. The exact orientation and location of the ship would be determined during the adaptation of the final sinking plan. Small charges would be designed to provide just enough force to open pre-cut holes in the hull for flooding. The final sinking plan would be coordinated with the NMFS to minimize the overall noise impacts above and below the water line. Other plans, including safety plans (for both people and wildlife) would be developed and approved by regulatory agencies. In addition, a lighted buoy, as required by the USCG would be installed within the permitted reef area.

The ship would be modified for sinking in an upright position on the ocean floor and would have a 60-foot clearance between the surface and the highest point of the ship. Divers would descend from the surface to the top of the ship at 60 feet and proceed to the main deck to be located at a depth of approximately 80 feet. They would then have access to the inside of the vessel at selected points. Ship masts would be left standing, and their tops cut and welded onto the deck. The ship would be modified to leave as much of its overall appearance as possible for habitat and diver attraction.

A safety zone radius of approximately 2,000 feet would be established around the reef site during the sinking to exclude all ship and submarine traffic not participating in the sinking action. The specific radius would be determined by the USCG on site. Any traffic within this radius would be warned to alter course or would be escorted from the site. Notices to aviators and mariners would be published in advance of the sinking exercise as coordinated with the USCG. An immediate "STOP WORK" would be ordered if any unauthorized craft entered the safety zone and could not be contacted. The "STOP WORK" order would continue until the safety zone was clear of unauthorized vessels.

Request for Proposals (RFPs) to complete the artificial reef project would be developed and publicly noticed for bid when funds are secured. It may take 4 to 6 months to complete the request for proposals, bid review, and award of contracts. Once contracts for project implementation are awarded, construction, clean-up, inspections, and sinking are expected to take approximately 11 to 16 months to complete. The date the contract is awarded may impact the timing of the project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after sinking the ship, side scan sonar



would be used to verify the correct placement of materials in the project area. The entire project is expected to take approximately 18 months to complete.

#### **8.7.5 Operations and Maintenance**

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A lighted buoy, as required by the USCG, would be installed within the permitted reef area. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

#### **8.7.6 Affected Environment and Environmental Consequences**

##### **8.7.6.1 Physical Environment**

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

##### **8.7.6.1.1 Geology and Substrates**

###### ***Affected Resources***

The proposed Ship Reef Project is located on the outer continental shelf in the Gulf of Mexico approximately 67 miles off the coast of Galveston, Texas. The location within the project area for the ship would be selected such that any hard bottom substrates that may be identified in the pre-deployment surveys are avoided. In general, the substrate consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

###### ***Environmental Consequences***

The Ship Reef Project site is located within the High Island Outer Continental Shelf Block (HI-A-424) in approximately 135 feet of water. Explosives would be used to sink the ship to quickly place the ship on the Gulf's floor rather than other types of flooding techniques. This would ensure correct orientation and placement. It is expected that some minor disturbance of the sediments would occur with the placement of the materials, but they would be short in duration and localized to the project area. There would be some localized compaction in the project site due to the placement of the ship, resulting in a minor long-term impact. However, this would not substantially change the substrate characteristics or local geology. Prior to sinking, a survey of the project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials.



Therefore, any adverse impacts to geology and substrates would be minor both in the short-term due to site disturbance and in the long-term due to minimal substrate compaction.

#### 8.7.6.1.2 Hydrology and Water Quality

##### ***Affected Resources***

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

##### ***Environmental Consequences***

Creation of a ship reef would result in short-term, minor adverse impacts to water quality. Specifically, short-term increases in turbidity would occur as a result of the ship settling onto the ocean floor. BMPs would include minimizing the size of explosives used during deployment of the ship. Additionally, all hazardous materials will be removed from the ship before deployment per EPA and US Maritime Administration National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs (2006). This will insure that water quality is not compromised from substances leaching from the ship itself. These BMPs along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the Ship Reef Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Therefore, any adverse impacts to water quality would be short-term and minor.

#### 8.7.6.1.3 Air Quality and Greenhouse Gas Emissions

##### ***Affected Resources***

The project area is located approximately 67 miles offshore and in an area that is not classified for NAAQS criteria pollutants under the Clean Air Act.

Implementation of the project would include transportation of the ship to the project area, which may include ship, barge, truck or other types of transportation.

##### ***Environmental Consequences***

Project implementation would require the use of tugboats, support vessels and possibly aircraft. Available BMPs would be employed to prevent, minimize, and control potential air pollutants during project implementation. Any air quality impacts that would occur would be localized and short in duration. During the permit review, the USACE determined that exhaust from vessel engines used in the transportation of the reef materials would be released; however, the exhaust should not significantly raise the amount of criteria pollutants commonly released by other vessels in the area and are clearly *de minimis* (USACE 2014a). After project completion, impact to air quality would be limited to ambient pollutants from boat traffic. Increased boat traffic caused by anglers traveling to the reef could potentially increase air pollution in the vicinity; however, increases in air pollution would still be

anticipated to be *de minimis*. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from vessels and aircraft would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the project:

- Shut down idling construction equipment, if feasible;
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

**Table 8-5. Estimated greenhouse gas impacts.**

EQUIPMENT <sup>23</sup>	NUMBER OF 8-HOUR DAYS	CO <sub>2</sub> (METRIC TONS) <sup>24</sup>	CH <sub>4</sub> (CO <sub>2</sub> e) (METRIC TONS) <sup>25</sup>	NO <sub>x</sub> (CO <sub>2</sub> e ) (METRIC TONS)	TOTAL CO <sub>2</sub> e (METRIC TONS)
Tugboats <sup>26</sup>	4	64.00	0.12	0.48	64.60
Boats <sup>27</sup>	5	6.50	0.01	0.05	6.55
Pickup truck <sup>28</sup>	1	0.16	0.00	0.00	0.16
<b>TOTAL</b>		<b>70.66</b>	<b>0.13</b>	<b>0.53</b>	<b>71.31</b>

Based on the assumptions described in the table above, and the small scale and short duration of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

<sup>23</sup> Emissions assumptions for all equipment based on 8 hours of operation.

<sup>24</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>25</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>26</sup> Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

<sup>27</sup> Fuel economy assumptions for a 300 hp marine diesel powerboat and 1000 hp marine diesel passenger ferry based on Becker, no date.

<sup>28</sup> Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

#### 8.7.6.1.4 Noise

##### ***Affected Resources***

Transportation and the use of explosives for sinking would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

##### ***Environmental Consequences***<sup>29</sup>

During transportation, the levels of noise would be consistent with the existing background noise in the respective areas. The sinking of the ship would produce noise due to the use of explosives. A buffer area would be determined and the public would not be allowed in the area while the ship sinking activities are occurring.

Because noise due to project implementation is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in areas adjacent to the project area would be aware of the increase in noise; however, it would not affect their activities. After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers and divers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating, personal vehicle use, and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

#### 8.7.6.2 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

##### 8.7.6.2.1 Living Coastal and Marine Resources

The Ship Reef Project consists of a permitted 80-acre artificial reef area, located approximately 67 miles off the coast of Galveston Island, Texas in a water depth of around 135 feet. The project area does not contain seagrass beds. An additional survey would be conducted prior to deployment of the ship to identify any hard substrates that would support corals or hard structure habitats. If any such substrates are identified, those areas would not be used to sink the ship. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

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<sup>29</sup> Potential impacts to marine species are addressed in the Biological Environment (Section 8.6.5.5).

### ***Affected Resources***

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the Ship Reef Project area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species such as red snapper, grouper, ling, dorado, and black fin tuna can also be found in the project area.

### ***Environmental Consequences***

This project would affect marine and estuarine fauna. Many organisms would likely leave the area. However, those that do not leave the project area may be affected at different intensities as a result of primarily the explosives used in the sinking of the ship. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the sinking of the ship. However, these types of species are not typically numerous in these areas. The relative abundance of sessile organisms would not be significantly impacted since the footprint is small. The small overall surface impact (with potential impact to sessile organisms) of the ship is considered a trade-off to the overall habitat potential of the ship itself. The existing habitat is sand-silt with little to no vertical relief. The ship would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011).

Most impacts would be related to the techniques used to sink the ship. The final sinking plan would be coordinated with the NMFS to minimize underwater impacts from explosives. The explosive charges employed would be the smallest needed to puncture pre-cut plates in order to sink the ship. Detonations of explosives along the ship would be in a rapid series rather than simultaneous in order to minimize impacts to marine fauna.

The placement of reefing materials on the soft bottom may temporarily increase turbidity in localized areas as sediments are resuspended into the water column. Increased turbidity can affect the use of the project area by juvenile and adult fish as well as adult shrimp species, which are common in the project area throughout the year. However, the resuspended sediments are expected to settle quickly after the ship has been deployed.

Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish, an invasive species, are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Garden Banks Marine Sanctuary), south to the Texas Clipper site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can.

This project would likely result in both short and long-term minor impacts related to disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. Benthic organisms that inhabited the footprint of the area upon which the ship comes to rest would be lost. However, it would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and mobile crustaceans.

#### **8.7.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the FWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act. The Ship Reef Project would be implemented several miles offshore in waters greater than 100 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act. The FWS concurred that the project would not affect federally listed and candidate species or critical habitats under the jurisdiction of the FWS, or result in take of bald eagles or migratory birds (FWS 2013).

#### ***Affected Resources***

##### **Endangered Species**

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Since there are currently no artificial reef structures in the permitted area, no endangered or threatened species are likely to be utilizing the project area at the time of project implementation as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

There is no designated or proposed critical habitat for any other federally-listed, proposed, or candidate species in the project area.

### Essential Fish Habitat

EFH in the project's area of effect is identified and described for various life stages of 44 managed fish and shellfish (GMFMC 1998). The Ship Reef Project is located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

**Table 8-6. EFH within the vicinity of the Ship Reef proposed area of effect.**

Species	Life stage(s) Found at Location	Fisheries Management Plan
<b>Highly Migratory Species (HMS)</b>		
Scalloped Hammerhead Shark ( <i>Sphyrna lewini</i> )	All	HMS
Great Hammerhead Shark ( <i>Sphyrna mokarran</i> )	All	HMS
Bull Shark ( <i>Carcharhinus leucas</i> )	All	HMS
Atlantic Sharpnose Shark ( <i>Rhizopriondon terraenovae</i> )	All	HMS
Bonnethead Shark ( <i>Sphyrna tiburo</i> )	All	HMS
Blacktip Shark ( <i>Carcharhinus limbatus</i> )	All	HMS
Spinner Shark ( <i>Carcharhinus brevipinna</i> )	Neonate, Juvenile	HMS
Lemon Shark ( <i>Negaprion brevirostris</i> )	Neonate, Juvenile	HMS
Finetooth Shark ( <i>Carcharhinus isodon</i> )	All	HMS
Dusky Shark ( <i>Carcharhinus obscurus</i> )	Adult, Juvenile	HMS
Tiger Shark ( <i>Galeocerdo cuvier</i> )	Adult, Juvenile	HMS
<b>Red Drum</b>		
Red Drum ( <i>Sciaenops ocellatus</i> )	Adult	Red Drum
<b>Shrimp</b>		
Brown Shrimp ( <i>Farfantepenaeus aztecus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
White shrimp ( <i>Litopenaeus setiferus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
<b>Coastal Migratory Pelagics</b>		
Cobia ( <i>Rachycentron canadum</i> )	Larvae, Juvenile, Adult, Spawning Adult	Coastal Migratory Pelagics
King Mackerel ( <i>Scomberomorus cavalla</i> )	Juveniles, Adults	Coastal Migratory Pelagics
<b>Reef Fish (Triggerfish, Jacks, Snappers, Groupers)</b>		
Gray triggerfish ( <i>Balistes capris</i> )	Eggs, Adults, Spawning Adult	Reef
Greater amberjack ( <i>Seriola dumerili</i> )	Eggs, Larvae, Spawning Adult	Reef
Almaco jack ( <i>Seriola rivoliana</i> )	Eggs, Spawning Adult	Reef
Red snapper ( <i>Lutjanus campechanus</i> )	All	Reef
Gray (mangrove) snapper ( <i>Lutjanus griseus</i> )	Adult, Spawning Adult	Reef
Dog Snapper ( <i>Lutjanus jocu</i> )	Eggs, Larvae, Spawning Adult	Reef
Lane snapper ( <i>Lutjanus synagris</i> )	Eggs, Juvenile, Adult	Reef
Wenchman ( <i>Pristipomoides aquilonaris</i> )	Adult	Reef
Vermilion snapper ( <i>Rhomboplites aurorubens</i> )	Juvenile	Reef
Gag ( <i>Mycteroperca microlepis</i> )	Adult	Reef

## **Marine Mammals**

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and is the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis 2002; NMFS 2008). Because of the relatively shallow depth of 73 feet at the project location and the established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 135 feet in the project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the project area, which is 67 miles offshore. Because the FWS concurred that the project would not affect West Indian manatee under the ESA, the Trustees determined that no take of manatee under the MMPA would occur.

## ***Environmental Consequences***

Project deployment would have minor short-term impacts to protected species and their habitats in the area where the ship would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles, such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat. The Trustees have started coordination and reviews with NMFS under the Endangered Species Act. The final sinking plan will include input from the NMFS to minimize the overall noise impacts above and below the water line.

Impacts to the water column can affect the use of the "potential effects area" by marine dependent, juvenile and adult fish and adult shrimp species, which are common in the project area throughout the year. The final sinking plan will be adapted with input from the NMFS to minimize underwater impacts from explosives. The lowest possible net explosive weight per detonation will be used to minimize impacts to marine life. In addition, devices will be used to create a delay between sections of the ship to minimize the high frequency energy from the charges that passes through the hull into the water. Any noise transmitted to the ocean environment as a result of the sinking will be of short duration



(measured in seconds) and will be strategically deployed to minimize the effects. Any potential loss of species due to the use of explosives will be outweighed by the long-term net gains of increased hard bottom habitat, productivity, and increased bio-diversity within the project area.

While most motile fauna such as crab, shrimp, and finfish have the ability to avoid the area during the sinking process, this project will permanently displace a small portion of the existing natural soft bottom and sand habitat within the project area. This project would result in a minor long-term impact to marine soft bottom EFH by covering it with reef pyramid structures and effectively converting the naturally occurring soft bottom to artificial hard bottom substrate. Soft bottom habitat is very abundant in the Gulf of Mexico whereas hard bottom habitat acreage is much more limited. The relative abundance of soft bottom habitat within and surrounding the project area would not be significantly impacted due to the small footprint of the ship's keel.<sup>30</sup> The conversion from soft bottom habitat to hard bottom substrate would be considered a habitat trade off by providing new hard structures to be colonized by encrusting marine organisms.

NMFS concurred with the EFH assessment for the project, which determined that temporary and localized turbidity impacts and permanent impacts to soft bottom EFH would occur; however, the creation of new hard structure in the Gulf may also create benefits to some species managed under the Magnuson-Stevens Act by providing foraging habitat, cover, and conditions favorable for encrusting benthic colonization (NMFS 2014e).

The Ship Reef site is located at a depth of around 135 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they should not be impacted during the deployment of the material and no incidental take of marine mammals is anticipated. Sinking of the ship would only occur during daylight hours and should be completed within 1-2 days. Impacts to wildlife would be avoided via management guidelines and techniques. During deployment of the ship, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the zone of influence. Work would be halted until such time as the area is deemed safe to continue the operation. Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions would be followed (NMFS 2006).

#### **8.7.6.3 Human Uses and Socioeconomics**

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

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<sup>30</sup> It is estimated that the surface area on the keel of the ship would be 12,500 square feet, which would cover less than 1% of the permitted 80 acres within the site.

#### 8.7.6.3.1 Socioeconomics and Environmental Justice

##### ***Affected Resources***

Artificial reefs enhance the fishing and diving opportunities at reef sites. A study from 1995 found that over 58,000 individuals visited artificial reefs. This study also surveyed boat captains and found that a ship was a preferred structure for future artificial reefs (Ditton et al. 1995).

There are oil and gas pipelines within a 5-mile radius of the Ship Reef Project; there would be no negative impacts to the exploration and production of oil and gas. The project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts and a lighted buoy would be in the permitted reef area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

##### ***Environmental Consequences***

Because this Ship Reef Project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the project. There would be indirect beneficial effects to the local economy due to increased fishing and diving opportunities provided by the artificial reef. Artificial reefs enhance the fishing and diving opportunities at reef sites. Given the demand for fishing and diving on artificial structures, the construction of the Ship reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The project would benefit the local economies adjacent to the project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter and diving businesses. An economic impact evaluation conducted for the Texas Clipper artificial reef in Texas demonstrated that anglers' expenditures were over \$3.2 million and divers expenditures were over \$5.4 million locally over a 3-year period (2008-2010). It is expected the commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would be unaffected as a result of the proposed project. The proposed project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

##### ***Environmental Justice Analysis***

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.

- The impact must be disproportionately high and adverse on the minority or low-income population.

The Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 67 miles offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed project.

During the permit review, the USACE determined that the project would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin nor would it have a disproportionate effect on minority low-income communities (USACE 2014b).

#### 8.7.6.3.2 Cultural Resources

##### ***Affected Resources***

Automated Wreck and Obstructions Information System data documents no sunken vessels in the immediate vicinity of the project area (HI-A-424). A high-resolution geophysical survey was conducted in November 2013 to ensure that no historically or culturally significant areas would be impacted during the deployment of the artificial reef materials. The data collected during the survey was assessed for evidence of high probability areas for prehistoric occupations and shipwrecks. Company and public files were reviewed in conjunction with the magnetometer, sonar, and pinger data for evidence of any human-made features within the project area. No evidence of existing human-made features within the survey was evident in company files, public files, or within the geophysical datasets. One unidentified magnetic anomaly was noted in the survey area. If the ship that is proposed for acquisition for this project is a historical resource, it would be evaluated for its cultural significance and suitability for this project before it is used.

##### ***Environmental Consequences***

If any culturally or historically important resources are identified during project preparations or pre-deployment surveys, such areas would be avoided during deployment of the ship. If the ship itself is a historic resource, it would be evaluated and a determination would be made about its suitability for this project. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

#### 8.7.6.3.3 Land and Marine Management

##### ***Affected Resources***

TPWD obtained a USACE permit (SWG-2013-00249) for the Ship Reef Project under Section 10 of the Rivers and Harbors Act in March 2014. The permit requires that the Ship Reef Project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as

established by the USACE and the USCG. The USCG has conducted a preliminary review of this project and has approved a 60-foot clearance. A lighted buoy would be required.

The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and provide beneficial impacts to local economies. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Ship Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

### ***Environmental Consequences***

The Ship Reef Project would be located offshore, and would not be subject to zoning, land use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, it would not have any impacts to the oil and gas production facilities and pipelines in the area of the project. In addition, the project is located greater than 2 miles from the designated shipping fairway and would comply with the USACE and USCG clearance requirements above the reef. Thus, the project would not adversely impact shipping and navigation use in the project area, and would be consistent with current uses. Therefore, land and marine management would be unaffected by the Ship Reef Project.

#### 8.7.6.3.4 Aesthetics and Visual Resources

##### ***Affected Resources***

The ship would be towed offshore to the permitted reef area and sunk. The ship would be on the ocean floor and would not be visible from the surface. The reef would be identified by a lighted buoy and associated signs.

##### ***Environmental Consequences***

The use of large equipment could have a temporary visual impact during the time of project implementation. The deployment time would be short and therefore any visual impacts would be short in duration as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The lighted buoy and associated signs would introduce a new visual component to the area; however, these are common in the Gulf of Mexico and would not attract attention or detract from the view. After completion, visual impacts would be limited to boat traffic. Increased boat traffic caused by anglers traveling to the reef would be consistent with the surroundings or designated uses. The boats would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Therefore, the Ship Reef Project is expected to have only minor short-term impacts aesthetics and visual resources.

#### 8.7.6.3.5 Tourism and Recreational Use

Currently an artificial reef does not exist in the area. Artificial reefs enhance the fishing and diving opportunities at reef sites. A study from 1995 found that over 58,000 individuals visited artificial reefs. This study also surveyed boat captains and found that a ship was a preferred structure for future artificial reefs (Ditton et al. 1995). An economic impact evaluation conducted for the Texas Clipper artificial reef in Texas demonstrated that anglers took over 13,000 trips and divers took over 11,000 trips during a 3-year period (2008-2010). Given the demand for fishing and diving on artificial structures, the construction of the Ship reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers.

##### ***Environmental Consequences***

Because the Ship Reef Project is 67 miles offshore and is not placing materials near an existing reef, it would not have any impacts on recreational uses in the area. Commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access points from land include the Freeport Ship Channel to the west-northwest and Galveston Harbor/Bolivar Roads Channel to the north-northwest. Each channel has nearby public boat ramps, marinas, and harbors, which makes the project very accessible to the public. Therefore, any adverse impacts to tourism and recreational use would be short-term and minor occurring only during deployment of the ship when the area is temporarily closed to other uses. Given the demand for fishing and diving on artificial structures, the construction of the Ship Reef would increase recreational fishing and diving opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local

recreational supply retailers, restaurants, and hospitality providers. The project is expected to result in beneficial impacts to tourism and recreational uses over the long-term.

#### 8.7.6.3.6 Infrastructure

##### ***Affected Resources***

The project area is located approximately 67 miles off of Galveston, Texas and within approximately 7 miles of a shipping fairway, 3 miles of oil and gas pipelines, and 11 miles to the nearest oil and gas platform. The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline. There would not be any adverse impacts to oil and gas platforms or pipelines. The Ship Reef Project area would be marked with a navigational buoy.

##### ***Environmental Consequences***

The project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed during the marine transport phase. Therefore, infrastructure will be unaffected from the proposed project.

#### 8.7.6.3.7 Public Health and Safety and Shoreline Protection

##### ***Affected Resources***

The project deployment would use mechanical equipment, boats, and barges that use oil, lubricants and fuels. The ship that would be acquired for use in this project may have oil and hazardous waste that would need to be disposed of. The ship would be cleaned in accordance with EPA's and U.S. Maritime Administration's *National Guidance: Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs*. The hull would be modified to ensure safety for divers and meet requirements, inspections, and modifications stipulated by TPWD, EPA and the USCG. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. An explosives plan and associated safety procedures would be developed, reviewed, and approved by government agencies before project implementation.

##### ***Environmental Consequences***

Because of the nature and location of the Ship Reef Project, no impacts to shoreline erosion are anticipated as a result of the implementation of this project.

The ship would be cleaned of debris, loose items, and hazardous substances to a level that meets or exceeds BMP guidelines and complies with health and safety statutes and regulations as set forth by the EPA, U.S. Department of Transportation Maritime Administration (MARAD), and Texas. All hazardous materials handled during ship cleaning would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. Pollution booms and any other required pollution response equipment would be staged at the facility, ready for deployment to guard against any pollution discharge. A Spill Prevention and Emergency Response Plan would be developed and approved. All federal and state regulations would be followed to clean, remove and dispose all hazardous materials generated from the cleaning of the ship. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into cleanup activities to ensure the proper handling, storage, transport and disposal of

all hazardous materials. Personal protective equipment would be required for all ship cleaning and explosives personnel and authorized access zones would be established at the perimeter during ship cleaning and explosives use. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) as required and all federal regulations would be followed during the cleanup. A safety zone radius of approximately 2,000 feet would be established around the reef site to exclude all ship and submarine traffic not participating in the sinking action. The specific radius would be determined by the USCG on site. Any traffic within this radius would be warned to alter course or would be escorted from the site. Therefore, public health and safety and shoreline protection will be unaffected from the Ship Reef Project.

#### **8.7.7 Summary and Next Steps**

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Ship Reef Project would create an artificial reef within an 80 acre reef site, through the sinking of a ship in water about 135 feet deep. Texas would acquire and sink a ship that is at least 200 feet long and that has been cleaned of hazardous substances. The project is considered to fall under Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing and diving opportunities. The Trustees have started coordination and reviews under the Endangered Species Act, National Historic Preservation Act, and other federal statutes, where appropriate. The Trustees have completed consultations and reviews under the Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Section 10 of the Rivers and Harbors Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.



## 8.8 Mid/Upper Texas Coast Alternate Artificial Reef Project - Corpus Artificial Reef Project: Project Description

[The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).]

### 8.8.1 Project Summary

The proposed Corpus Artificial Reef Project will increase the amount of reef materials in a currently permitted artificial reef site (Outer Continental Shelf Block Mustang Island MU-775) located within Texas state waters in the Gulf of Mexico and approximately 11 miles from Packery Channel (near Corpus Christi Bay, Texas) (Figure 8-14). Previous deployments at the reef site placed artificial reef materials into the northwest quadrant and in the center of the 160-acre reef site. The proposed project will place predesigned concrete pyramids in the remaining portions of the 160-acre project area onto sandy substrate at a water depth of 73 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. These improvements would enhance recreational fishing opportunities. The estimated cost for this project is \$1,919,765, which includes an increase of \$134,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.<sup>31</sup> This project is an alternative to the Ship Reef Project, and is proposed for implementation only in the event that the Ship Reef Project proves to be technically infeasible.



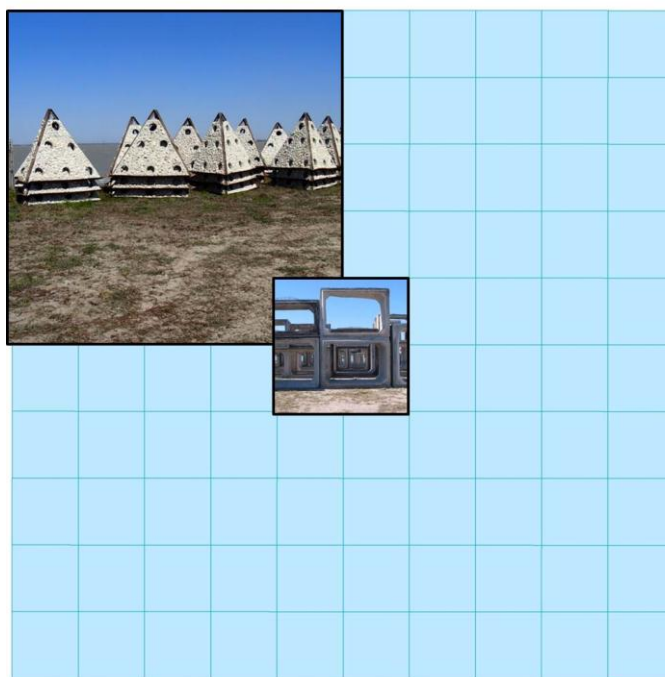
Figure 8-14. Location of the proposed Corpus Artificial Reef Project.

<sup>31</sup> In Texas, the estimated costs of artificial reef projects increased by \$200,000, a less than 3% increase, to cover marine archaeological and environmental compliance requirements for three of the artificial reef sites.

### 8.8.2 Background and Project Description

The purpose of the Corpus Artificial Reef Project is to enhance recreational fishing opportunities (and limited diving opportunities since water clarity is not usually conducive for diving) for Texas. TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The Program establishes artificial reefs to create reef fishery habitat as well as enhance commercial and recreational fishing opportunities in state and nearby federal waters. Artificial reefs provide complex, durable and stable habitats for many fishes and marine invertebrates. From an economic standpoint, artificial reefs attract anglers and divers to provide a significant fiscal boost to local economies.

The proposed project will increase the amount of reef materials in a currently permitted artificial reef site, located within Texas state waters in the Gulf of Mexico in the Outer Continental Shelf Block Mustang Island (MU-775). The current reef site is permitted for 160 acres, but only has materials in northwest quadrant and in the center of the permitted area (Figure 8-15). The proposed project will place predesigned concrete pyramids in the remaining portions of the 160-acre permitted area onto sandy substrate at a water depth of 73 feet, about 11 miles east of Packery Channel and Mustang Island State Park (near Corpus Christi Bay, Texas).



**Figure 8-15. Diagram of the 160-acre Corpus Artificial Reef Project area. Areas designated by the pyramid and culvert images received artificial reef materials from a separate contract in fall 2013.**

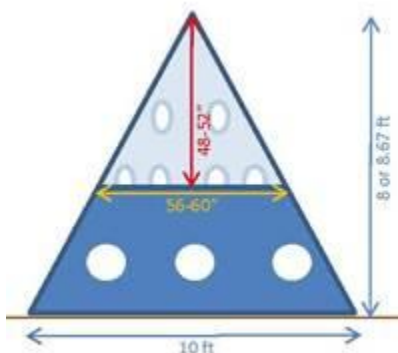
The location for the Corpus Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). TPWD's Artificial Reef Program also adheres to the Guidelines for Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National

Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs.

Consultations began with the Saltwater-Fisheries Enhancement Association and the City of Corpus Christi over the concept of reefs off Corpus Christi in Texas state waters in 2009. The MU-775 reef location was approved through several public city council meetings where numerous members of the public provided oral comments in support of the project. Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan. The TPWD Coastal Resource Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides easy access for the local population, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending to benefit the local economy.

Previous deployments at the permitted reef site placed artificial reef materials (predesigned pyramids and culverts) into the northwest quadrant and in the center of the 160-acre reef site. The Corpus Artificial Reef Project will randomly space 1,000 to 1,200 additional predesigned pyramids in the remaining portions of the permitted area.

Texas' artificial reefs are generally created and placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. The predesigned concrete pyramids will be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring. This project will use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure (Figure 8-16). This modification was required by NMFS in order to complete the ESA consultation (NMFS 2014a). Each pyramid structure should penetrate the substrate by no more than 2 feet.



**Figure 8-16. An example of the predesigned pyramid structures with the open side.**

### 8.8.3 Evaluation Criteria

This proposed project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Corpus Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the structures within state waters can be accomplished with smaller boats as well as decreased travel time and cost. The project would enhance opportunities for public use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement). Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1) and Section 6e of the Framework Agreement).

The project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act and the goals of the Texas Artificial Reef Fishery Management Plan. There were several public city council meetings where numerous members of the public provided oral comments in support of the project. The proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.8. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, BMPs and measures to avoid or minimize impacts described in Section 8.8 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation, operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

#### 8.8.4 Performance Criteria, Monitoring and Maintenance

This project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to increase the amount of reef materials in a currently permitted artificial reef site (MU-775) through the placement of 1,000 to 1,200 predesigned concrete pyramids within the open portions of the permitted reef site.

Performance criteria for this project will include a determination of successful construction of the Corpus Artificial Reef Project according to design, and then monitoring and maintenance to confirm that the reef materials are in place and available for recreational fishing opportunities. In order to determine successful placement of the constructed pyramids in accordance with the design, multi-beam side-scan surveys will be used to document the location of the pyramid structures and ensure all materials are located within the deployment zone and meet all permit conditions, including USCG clearance restrictions. Monitoring using side-scan sonar will be conducted annually (for 2 years) and after major storm events to document any movement and settling of the structures. Recreational use of the reef observed during the side-scan monitoring will also be documented.

While not funded through Early Restoration, recreational use monitoring is being conducted through ongoing research. Currently Texas A&M University-College Station is studying the social and economic impacts of Texas artificial reefs. Also, as TPWD's Artificial Reef Program looks to expand existing reefs and identify locations for new permitted reef areas, TPWD's Artificial Reef Program will continue to receive feedback from user groups regarding placement and use of reefs in Texas.

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities will be managed by the TPWD's Artificial Reef Program.

#### 8.8.5 Offsets

The Early Restoration benefits provided by the project, also known as NRD Offsets, are \$3,839,530<sup>32</sup> expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill.<sup>33</sup> This Offset is based on the use of a BCR ratio of 2.0,

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<sup>32</sup> The NRD Offset has been updated from the Draft Phase III ERP/PEIS to reflect the increased cost for completing the marine archaeological environmental compliance requirements.

<sup>33</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

reflecting the value that users are expected to be provided by the implementation of the proposed project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

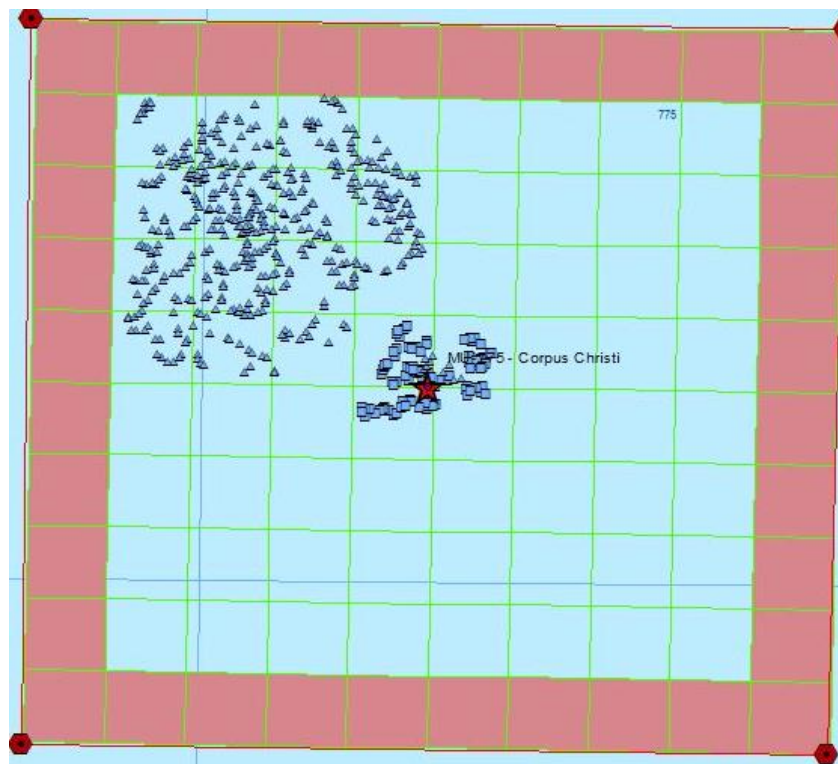
#### 8.8.6 Cost

The total estimated cost to implement this project is \$1,919,765, which includes an increase of \$134,000 over the original estimated cost to complete unanticipated marine archaeological environmental compliance requirements. This cost reflects current estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

## 8.9 Mid/Upper Texas Coast Alternate Artificial Reef Project - Corpus Artificial Reef Project: Environmental Review

[The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).]

The proposed Corpus Artificial Reef Project would increase the amount of reef materials in a currently permitted artificial reef site (Outer Continental Shelf Block Mustang Island MU-775) located within Texas state waters in the Gulf of Mexico and approximately 11 miles east of Packery Channel (near Corpus Christi Bay, Texas). The current reef site is permitted for 160 acres, but already has materials in the northwest quadrant and in the center of the permitted area (Figure 8-17). The proposed project would place predesigned concrete pyramids in the remaining portions (about 115 acres) of the 160-acre permitted area onto sandy substrate at a water depth of 73 feet. As required by the ESA consultation with NMFS, the pyramid designs were modified so that one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure. These improvements would enhance recreational fishing opportunities. The estimated cost for this project is \$1,919,765 which includes an increase of \$134,000 over the original estimated cost to complete marine archaeological environmental compliance requirements.



**Figure 8-17. Pyramids designate areas that received pyramid structures and squares designate areas that received culvert reef materials under a separate contract in fall 2013.**



### 8.9.1 Introduction and Background

Texas experienced a loss of recreational use along the Texas coast during the spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The Corpus Artificial Reef Project is intended to enhance recreational fishing opportunities by creating artificial reef habitat. Artificial reefs created in state waters benefit anglers by providing reefs that are more readily accessible than other natural areas which can be more than 30 miles offshore. Transportation to the reef sites within state waters can be accomplished with smaller boats and the short distance allows for a decreased travel time and cost when compared to other offshore options. This project would enhance the public's use and enjoyment of natural resources, helping to offset adverse impacts to such uses caused by the Spill. Artificial reef creation and enhancement was suggested as a restoration measure during the Trustees' public scoping meetings in Texas for the PEIS as part of the damage assessment and restoration plan effort for the Spill and submitted as a restoration project on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

The project area was chosen to be appropriate for artificial reef placement, in part, because of public support for the site. There were several public city council meetings where numerous members of the public provided oral comments in support of the project. The TPWD developed the Texas Artificial Reef Fishery Management Plan (TPWD 1990) which guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reef sites. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts and impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best scientific data available in the decision-making process.

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a USACE permit (SWG-2010-01407) for the Corpus Artificial Reef Project under Section 10 of the Rivers and Harbors Act and under Section 404 of the Clean Water Act in May 2011.

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels, and would avoid impacts to coastal waters. Additionally, the lease requires that the project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements.

The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also adheres to the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. All reefs must be constructed, sited, monitored and maintained so that they enhance and conserve fishery resources, and facilitate easy access for Texas recreational and commercial use. Entities constructing artificial reefs must minimize conflicts among competing uses, avoid adverse environmental impacts to public health and property, ensure that the reef projects are consistent with all applicable laws and regulations, and use the best available scientific data in the decision-making process. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

#### **8.9.2 No Action**

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Corpus Artificial Reef Project or the Ship Reef Project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

#### **8.9.3 Project Location**

The Corpus Artificial Reef Project is located within the Gulf of Mexico in the Outer Continental Shelf Mustang Island Block 775 (MU-775) offshore of Nueces County, Texas. It is located about 11 miles off Packery Channel and Mustang Island State Park (near Corpus Christi Bay, Texas) at a center point of 27.6464° N 97.0074° W (North American Datum of 1983). The permitted area is 160 acres of sandy substrate at a water depth of 73 feet. The reef site has been permitted for a 50-foot clearance (50 feet of clear water between the surface and any reef material), which allows for a 23-foot profile of material off the ocean bottom.

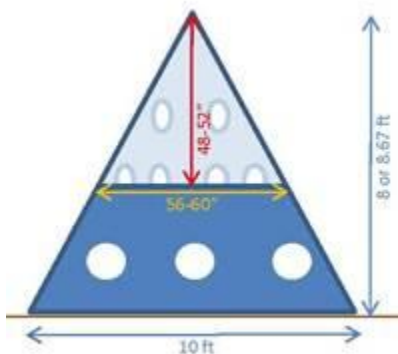
The location for the Corpus Artificial Reef Project was selected after request for and consideration of public input and in accordance with site selection guidelines set out in the Texas Artificial Reef Fishery Management Plan (TPWD 1990). Artificial reefs in Texas are designed to enhance existing marine habitat without compromising or adversely affecting bottoms that already have significant hard substrate (i. e. coral reefs, rock outcrops, etc.). Therefore, reefs would not be created on existing natural hard bottom substrates.

Consultations began with the Saltwater-Fisheries Enhancement Association and the government of the City of Corpus Christi over a nearshore reef concept in 2009. Several potential sites were determined and TPWD conducted bottom surveys with scientific divers to eliminate those sites whose bottom was too silty and areas whose bottom may not be hard enough to support the weight of artificial reefs. A "short list" of several reef sites was developed, with Corpus Reef providing the best alternative that

would meet management goals. The Corpus Reef location was approved through several public city council meetings where numerous members of the public provided oral comments in support of the project. Consultation with the TGLO was completed as required to ensure that the site was consistent with the goals and policies of the Texas Coastal Management Plan. The TPWD Coastal Advisory Committee (composed of individuals from relevant industries and groups appointed by the Chairman of the Texas Parks and Wildlife Commission) also provided input into the location of the reef site. The reef site is located in an area that provides easy access for locals, does not encroach on existing natural hard substrate, and can be promoted by the local government to encourage tourism and spending on the local economy.

#### 8.9.4 Construction and Installation

Surveys of the project area were conducted in December 2013 to identify potential hard bottom substrates and cultural resources. This project would deploy approximately 1,000 to 1,200 predesigned concrete pyramids in the project area. The predesigned concrete pyramids would be complex and have a large surface area which would attract marine life. The predesigned concrete pyramids would be made of materials to match a natural reef in pH and substrate using concrete, limestone, and rebar or other similar materials. Pyramid structures that have been used previously for artificial reefs had a rebar frame inside of a 6,000-pound concrete structure built to withstand storm events. The structures were 8 feet high and also had a three-sided footprint (10-foot by 10-foot by 10-foot) designed to prevent settling and scouring. This project would use similarly structured pyramids, with one modification – one side of the constructed pyramids will be open on the top half to allow sea turtles to move freely in and out of the structure (Figure 8-18). This modification was required by NMFS in order to complete the Endangered Species Act consultation (NMFS 2014a). Each pyramid should penetrate the substrate by no more than 2 feet, and the structures would be randomly spaced over the remaining portions of the 160-acre permitted reef (areas without reef materials).



**Figure 8-18. An example of the predesigned pyramid structures with the open side.**

Texas' artificial reefs are generally placed by commercial marine contractors selected through a competitive bid process and contracted by TPWD, who holds the permit for the reef site. A vessel that would minimize its use of anchors or a dynamically positioned vessel (i.e. not anchored) would slowly lower the pyramids into specific position by crane or another method. During pyramid deployment, position is usually maintained visually by use of a temporary marker buoy attached to the first pyramid deployed. A GPS antenna would be positioned at the top of the crane boom to monitor the location of

the pyramids as they are placed. As the crane cable lowers the pyramid into the water, a buoy attached to the release mechanism on the crane cable will be pushed upward by water pressure (the orange buoy can be seen at the top of the crane cable in Figure 8-19). When the pyramid nears 5 feet from ocean bottom, the buoy will trigger the release mechanism and the pyramid will drop to the bottom in an up-right position.



**Figure 8-19. Photograph of previous artificial reef material deployment completed in Texas.**

It is expected that the pyramids would be transported directly from the manufacturer, therefore a designated staging and stockpiling site is not anticipated. The contractor may choose to have the pyramids built locally, likely working with a local concrete company. Previously purchased pyramids were built in an empty lot at the Port of Corpus Christi.

Request for Proposals (RFPs) to complete the Corpus Artificial Reef Project would be developed and publicly noticed for bid when funds are secured. The process of requesting bid proposals, bid review, and award of contracts may take 4 to 6 months. Once contracts for project implementation are awarded, construction of the pyramids is expected to take 3 to 8 months to complete. If transportation is required, it is expected to take 1-2 weeks depending upon where the manufacturer is based and transportation method (type of vessel). Based on previous artificial reef projects completed in Texas, it is anticipated that one crane barge, one tugboat, one supply barge, two excavators, and two small trucks may be used during reef deployment. Deployment of the pyramids into the project area is expected to take 10 days, working 14 hours per day (daylight hours), but is dependent on weather conditions. The date the contract is awarded may impact the timing of the project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions. Before and after reef construction, surveys would be used to verify the correct placement of materials in the project area.

#### **8.9.5 Operations and Maintenance**

No ongoing maintenance beyond the annual surveys and buoy maintenance is anticipated unless there is significant movement of artificial reef materials, which is not expected to occur. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements. Regular maintenance of the buoy marker would include cleaning the chain, replacing the light, and replacing or repairing the buoy as needed. Monitoring and maintenance activities would be managed by the TPWD's Artificial Reef Program.

#### 8.9.6 Affected Environment and Environmental Consequences

The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for a permit to create an artificial reef in the project area (USACE 2011).<sup>34</sup> The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. Parts 320-332. The following factors were considered by the USACE during the evaluation process but were determined to not be particularly relevant to the permit application: shoreline erosion and accretion, aesthetics, land use, general environmental concerns, conservation, floodplain values, safety, energy needs, flood hazards, water supply and conservation, food and fiber production, and mineral needs. The EA and SOF found that the Corpus Artificial Reef Project would result in the creation of an artificial reef that would augment natural fisheries habitat for juvenile reef fish and provide sport and recreational fishing benefits for the public.

When considering the overall impacts that would result from this project, in context with the overall impacts from similar past, present, and reasonably foreseeable future projects, the USACE concluded that their cumulative impacts are not considered to be significantly adverse. The USACE stated that it was likely they would receive similar projects in the future, which would go through a comparable review process.

The USACE stated that there have been no significant environmental effects identified resulting from the project and the impact of this proposed activity on aspects affecting the quality of the human environment was evaluated and determined that this action does not require an Environmental Impact Statement.

The USACE reviewed and evaluated, in light of the overall public interest, the documents and factors concerning the permit application, as well as the stated views of other interested Federal and non-Federal agencies and the concerned public, relative to the proposed work in navigable waters of the United States. Based on their review, the USACE found that the proposed project is not contrary to the public interest and that a permit should be issued. The permit was issued in May 2011 (SWG 2010-01047).

##### 8.9.6.1 Physical Environment

The Gulf of Mexico is the ninth largest body of water in the world and consists of the intertidal zone, continental shelf, continental slope, and abyssal plain. The nearshore coastal environment extends from estuarine waters seaward to the continental shelf edge of the Gulf of Mexico, including the coastline and the inner continental shelf at depths from 0 to 600 feet. The northern Gulf of Mexico is dominated by inputs from the Mississippi River Basin, which drains 41% of the contiguous United States and contributes 90% of the freshwater entering the Gulf (EPA 2011a). Freshwater inflows to the Gulf provide nutrients and create hydrological conditions that create a wide range of ecosystems with unique

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<sup>34</sup> For purposes of the proposed action under NRDA, the EA and SOF do not provide enough analysis to incorporate the findings by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21). The Trustees therefore conducted the more detailed analysis documented here, and are not adopting the USACE EA or information from the SOF. As is appropriate, the Trustees will make an independent decision, and will not rely on the findings of the separate USACE NEPA process. The EA and SOF are discussed in this document for informational purposes only.

features and habitats. The description of the physical environment of the Gulf of Mexico is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

#### 8.9.6.1.1 Geology and Substrates

##### ***Affected Resources***

The Corpus Artificial Reef Project is located on the continental shelf in Texas waters approximately 11 miles east of Packery Channel off the coast of the Nueces County, Texas. The predominant sediment is clay overlain with deposits of sand and silt, mainly from the Mississippi River. Soft bottom habitat is not a unique habitat of concern like the hard bottom, deepwater coral, and deepwater community habitats. The nearshore deployment of artificial reef material would be implemented within the permitted area, avoiding areas where there are existing artificial reef materials (Figure 8-17). Except for the existing artificial reef structures, the substrate generally consists of flat to gently sloping soft, thick bottom with no vegetation such as seagrasses and no dynamic physical features or hard bottom outcrops that would support corals or habitats conducive for foraging or shelter.

##### ***Environmental Consequences***

The proposed project would be placed on Gulf sediments approximately 73 feet below the surface of the water. Prior to reef construction, a survey of the project area would be conducted. Any hard outcrops or uneven surfaces identified by the survey would be avoided during deployment of reef materials. During the placement process, pyramids would slowly be lowered via crane, bobcat or front-end loader, or other mechanical means onto the Gulf's floor. Each of the 1,000 to 1,200 structures would weigh approximately 6,000 pounds and cover a 43-square foot area (10-foot by 10-foot by 10-foot). The installation of each structure would result in some short-term disturbance of the substrate, which would resettle after each construction day. There would be some substrate compaction associated with weight of each structure resulting in a minor long-term impact. However, the substrate itself is very common in the coastal waters. Overall the disturbances to soils or substrates would likely be minor as the impacts would not result in changes to the character of the sediments, geologic features would be avoided and the level of compaction would occur over the local project area.

#### 8.9.6.1.2 Hydrology and Water Quality

##### ***Affected Resources***

The water quality in this area is highly influenced by input of sediment and nutrients from the Mississippi and Atchafalaya Rivers. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. The river system supplies nitrate, phosphate, and silicate to the shelf (Minerals Management Service 2005).

Water quality in the Gulf of Mexico is sufficient to support aquatic life use, recreation use, and general use. However, there are restricted consumption advisories due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).



There are no significant currents in the project area. There may be some surface currents during storm events, but these would be temporary and not expected to impact the reefs, which would be at least 63 feet below the water surface.

#### ***Environmental Consequences***

Short-term increases in turbidity would result from the in-water construction work. The installation of each structure would result in some short-term disturbance of the substrate and locally increased turbidity, which would likely resettle after each construction day. BMPs would include minimizing anchors/anchor spread during deployment and lowering materials slowly. These BMPs along with other avoidance and impact minimization measures required by state and federal regulatory agencies would be employed to minimize any water quality and sedimentation impacts. Given its location, the Corpus Artificial Reef Project would not result in any impacts to wetlands or floodplains. In addition, the placement of reef structures would not alter the hydrology of the area. Water quality would not be affected by reef materials as these materials are non-hazardous. Any associated sedimentation (turbidity plume) would quickly dissipate after the material hits the bottom. There would likely be short-term minor adverse impacts to water quality as there would be localized turbidity issues associated with structure placement, though water quality would quickly be restored after construction ends.

#### **8.9.6.1.3 Air Quality and Greenhouse Gas Emissions**

##### ***Affected Resources***

The proposed project area is 11 miles east of Packery Channel in offshore waters and is not classified for NAAQS criteria pollutants under the Clean Air Act. The nearest county, Nueces County, is not listed as a nonattainment area for any pollutant by the EPA.

Implementation of the Corpus Artificial Reef Project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation.

#### ***Environmental Consequences***

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the project vicinity due to construction vehicle emissions. Fine particulate matter associated with the concrete reef materials may become airborne during transportation and deployment. Any air quality impacts that would occur would be localized and short in duration. After project completion, impact to air quality would be limited to ambient pollutants from boat traffic. Increased boat traffic caused by anglers traveling to the reef could potentially increase air pollution in the vicinity; however, increases in air pollution would still be anticipated to be *de minimis*. Therefore, any adverse impacts to air quality would be short-term and minor.

Engine exhaust from barges, tugboats, excavators, and trucks would contribute to an increase in GHG emissions. Impact minimization measures would be employed to reduce the release of GHG during project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Corpus Artificial Reef Project:

- Shut down idling construction equipment, if feasible;



- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, excavators, barges, and tugboats, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

Based on the assumptions described in the table above, and the small scale and short duration of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

#### 8.9.6.1.4 Noise

##### ***Affected Resources***

Implementation of the Corpus Artificial Reef Project would include transportation of the reef materials to the project area, which may include, ship, barge, truck or other types of transportation. The heavy equipment, vehicles, and boats would produce noise both above the water surface and throughout the water column. The primary sources of ambient (background) noise in the project area are operation of vehicles, aircraft, commercial and recreational vessels, and natural sounds such as wind and wildlife.

**Table 8-7. Estimated greenhouse gas impacts.**

EQUIPMENT	NUMBER OF 8-HOUR DAYS	CO <sub>2</sub> (METRIC TONS) <sup>35</sup>	CH <sub>4</sub> (CO <sub>2</sub> e) (METRIC TONS) <sup>36</sup>	NO <sub>x</sub> (CO <sub>2</sub> e ) (METRIC TONS)	TOTAL CO <sub>2</sub> e (METRIC TONS)
Pickup truck <sup>37</sup>	10	1.60	0.001	0.01	1.60
Excavator	10	3.80	0.002	0.02	3.80
Boats (x2)	10	26.00	0.040	0.20	26.20
Tugboat <sup>38</sup>	10	160.00	0.300	1.20	161.50
Crane Barge	10	15.90	0.021	0.11	16.00
Supply Barge	10	13.00	0.020	0.10	13.100
<b>TOTAL</b>		<b>220.30</b>	<b>0.384</b>	<b>1.640</b>	<b>222.20</b>

<sup>35</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>36</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>37</sup> Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

<sup>38</sup> Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

### ***Environmental Consequences***

The construction and transport of the reef materials and the actual deployment would all produce noise. However, the levels of noise would be consistent with the existing background noise in the respective areas. Because construction noise is temporary, negative impacts to the human environment during construction activities would be short-term and minor, as only those in the immediate project area would be affected by the increase in noise; however, it would not affect their activities.

After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area. Overall, long-term noise effects from boating and other recreational activities would be minor. Therefore, any short-term or long-term noise impacts would be minor.

#### **8.9.6.2 Biological Environment**

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). These habitats shelter 97% of all fish and shellfish harvested from the region during spawning or other parts of their life cycle (NOAA 2010). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

##### **8.9.6.2.1 Living Coastal and Marine Resources**

The Corpus Artificial Reef Project consists of a permitted 160-acre artificial reef area, located approximately 11 miles east of Packery Channel off the coast of Nueces County in a water depth of around 73 feet. The project area does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There are existing artificial reef materials in the project site. The location of existing reef materials is known and they would be avoided during reef deployments associated with this project. The primary living coastal and marine resources are marine and estuarine fauna (fish, shell beds, benthic organisms).

### ***Affected Resources***

Biological interactions as well as physiochemical factors such as substrate, temperature, salinity, water depth, currents, oxygen, nutrient availability, and turbidity are critical in determining the distribution, composition, and abundance of continental shelf soft bottom communities. Soft sediment infaunal communities on the continental shelf are generally dominated, in both number of species and individuals, by surface-deposit-feeding polychaete worms, followed by crustaceans and mollusks (Bureau of Ocean Energy Management 2012). Common species on the sediment surface include sea anemones, brittle stars, portunid crabs, and penaid shrimp. These animals are typically distributed on the basis of water depth and sediment composition or grain size, with seasonal components also being present in shallower water areas.

Benthic fauna include infauna (animals that live in the substrate, including mostly burrowing worms, crustaceans, and mollusks) and epifauna (animals that live on or are attached to the substrate, crustaceans, as well as echinoderms, mollusks, hydroids, sponges, and soft and hard corals). Shrimp and demersal fish are closely associated with the benthic community. Substrate is the single most important factor in the distribution of benthic fauna (densities of infaunal organisms increase with sediment particle size), although temperature and salinity are also important in determining the extent of faunal distribution. Depth and distance from shore also influence the benthic faunal distribution. Lesser important factors include illumination, food availability, currents, tides, and wave shock (Minerals Management Service 2005). In general, the vast majority of bottom substrate available to benthic communities in the project Area consists of soft, muddy bottoms; the benthos here is dominated by polychaetes.

Many fish species including sharks, snapper, grouper, and mackerel can also be found in the project area.

### ***Environmental Consequences***

Fauna in the project area may be affected by the Corpus Artificial Reef Project. Some species may leave the area during deployment activities, but they would likely return after activities cease. Sessile and other limited movement species, especially those buried/burrowed in the substrate could be injured or killed by the placement of the reef structures. However, these types of species are not typically numerous in these areas and the footprint of the reef structures is small (10-foot by 10-foot by 10-foot). The relative abundance of sessile organisms would not be significantly impacted since the footprint is small and spacing between pyramids, although random, would be greater than 20 feet apart. The small overall surface impact (with potential impact to sessile organisms) of the reef material is considered a trade-off to the overall habitat potential of the reef material itself. The existing habitat is sand-silt with little to no vertical relief. The artificial reef materials would provide for more surface area in the water column, thereby providing for additional areas for sessile organisms to attach. By providing food and shelter, artificial reefs can enhance overfished populations of resident reef fish like snapper and grouper. Transient species like mackerel, shark, and billfish can also benefit by feeding on the resident fish (USACE 2011).

The placement of reef materials on the soft bottom may temporarily increase turbidity in localized areas as sediments are resuspended into the water column. Increased turbidity can affect the use of the project area by juvenile and adult fish as well as adult shrimp species, which are common in the project area throughout the year. However, the resuspended sediments are expected to settle after each construction day.

Non-native colonization is not within Trustee control and the materials used for this project would not be colonized any faster than any other materials in the Gulf (i.e. bridges, piers, ship wrecks, standing petroleum platforms, etc.). Lionfish, an invasive species, are already present in large numbers in the Gulf and have been seen on the TPWD artificial reef sites from the High Island area (near the National Flower Banks Marine Sanctuary), south to the Texas Clipper artificial reef site near Mexico in the last several years. Divers remove them during monitoring trips by the TPWD's Artificial Reef Program when they can.

This project would likely result in short-term minor adverse impacts due to construction-related disturbances and small changes to sessile species populations if present; however, there would likely be no impact to feeding, reproduction, or other factors affecting population levels. The reef project would provide overall long-term benefits to marine species providing additional reef fish habitat, increased benthic productivity, and enhanced recruitment and production of fish and crustaceans.

#### **8.9.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the FWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act. The Corpus Artificial Reef Project would be implemented several miles offshore in waters greater than 50 feet depth (where there is no bird nesting habitat), therefore the discussion that follows focuses on species protected by the Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and Marine Mammal Protection Act. The FWS concurred that the project would not affect federally listed and candidate species or critical habitats under the jurisdiction of the FWS, or result in take of bald eagles or migratory birds (FWS 2013).

#### ***Affected Resources***

##### **Endangered Species**

Five species of endangered or threatened species of sea turtles were identified as possibly being present in the project area: loggerheads, green, hawksbill, Kemp's ridley, and leatherback turtles. Sea turtles nest on beaches, and most species use nearshore hard bottom reef complexes, shallow water habitat (including seagrasses), or other coastal areas with rocky bottoms to forage for food. Due to the already existing reef structures in the permitted area, endangered or threatened species may utilize the project area as habitat for foraging, breeding, or resting. This area has not been designated as critical habitat for any of the sea turtle species.

There is no designated or proposed critical habitat for any other federally-listed, proposed, or candidate species in the project area.

##### **Essential Fish Habitat**

EFH in the project's area of effect is identified and described for various life stages of 55 managed fish and shellfish (GMFMC 1998). The Corpus Artificial Reef Project is located in an area that is designated as EFH under the Magnuson-Stevens Fishery Conservation and Management Act for several species of shark, shrimp, coastal migratory pelagic species, and reef fish. No Habitat Areas of Particular Concern or EFH Areas Protected from Fishing were identified at the project location.

**Table 8-8. EFH within the vicinity of the Corpus Artificial Reef proposed area of effect.**

Species	Life stage(s) Found at Location	Fisheries Management Plan
<b>Highly Migratory Species (HMS)</b>		
Scalloped Hammerhead Shark ( <i>Sphyrna lewini</i> )	All	HMS
Great Hammerhead Shark ( <i>Sphyrna mokarran</i> )	All	HMS
Bull Shark ( <i>Carcharhinus leucas</i> )	All	HMS
Atlantic Sharpnose Shark ( <i>Rhizopriondon terraenovae</i> )	All	HMS
Bonnethead Shark ( <i>Sphyrna tiburo</i> )	All	HMS
Blacktip Shark ( <i>Carcharhinus limbatus</i> )	All	HMS
Spinner Shark ( <i>Carcharhinus brevipinna</i> )	Neonate, Juvenile	HMS
Lemon Shark ( <i>Negaprion brevirostris</i> )	Neonate, Juvenile	HMS
Finetooth Shark ( <i>Carcharhinus isodon</i> )	All	HMS
Dusky Shark ( <i>Carcharhinus obscurus</i> )	Adult, Juvenile	HMS
Tiger Shark ( <i>Galeocerdo cuvier</i> )	Adult, Juvenile	HMS
<b>Red Drum</b>		
Red Drum ( <i>Sciaenops ocellatus</i> )	Adult	Red Drum
<b>Shrimp</b>		
Brown Shrimp ( <i>Farfantepenaeus aztecus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
White shrimp ( <i>Litopenaeus setiferus</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
Pink shrimp ( <i>Litopenaeus duararum</i> )	Eggs, Larvae, Adult, Spawning Adult	Shrimp
<b>Coastal Migratory Pelagics</b>		
Cobia ( <i>Rachycentron canadum</i> )	Larvae, Juvenile, Adult, Spawning Adult	Coastal Migratory Pelagics
<b>Reef Fish (Triggerfish, Jacks, Snappers, Groupers)</b>		
Gray triggerfish ( <i>Balistes capricus</i> )	Eggs, Adults, Spawning Adult	Reef
Greater amberjack ( <i>Seriola dumerili</i> )	Eggs, Larvae, Spawning Adult	Reef
Almaco jack ( <i>Seriola rivoliana</i> )	Eggs, Spawning Adult	Reef
Red snapper ( <i>Lutjanus campechanus</i> )	All	Reef
Gray (mangrove) snapper ( <i>Lutjanus griseus</i> )	Adult, Spawning Adult	Reef
Lane snapper ( <i>Lutjanus synagris</i> )	Eggs, Adult	Reef
Wenchman ( <i>Pristipomoides aquilonaris</i> )	Adult	Reef
Vermilion snapper ( <i>Rhomboplites aurorubens</i> )	Juvenile	Reef
Goliath grouper ( <i>Epinephelus itajara</i> )	Adult	Reef
Yellowmouth grouper ( <i>Mycteroperca interstitialis</i> )	Eggs, Larvae, Adult	Reef
Gag ( <i>Mycteroperca microlepis</i> )	Adult	Reef

## Marine Mammals

Marine mammals known to occur in the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) plus the West Indian manatee. The project area is located within the NOAA-defined nearshore, estuarine waters to the continental shelf edge (depths of 0-656 feet). Typically whales do not occur in the nearshore waters over the continental shelf of the Gulf of Mexico. Of the 22 species of marine mammals known to occur in the Gulf of Mexico, only three protected species of dolphins commonly occur in nearshore waters (bottlenose, Atlantic spotted, and Risso's). The bottlenose dolphin inhabits the Gulf of Mexico year round and are the most commonly observed dolphin in nearshore waters. The Atlantic spotted dolphins prefer warm-temperate waters over the continental shelf, edge, and upper reaches of the slope and are very active at the surface. Risso's dolphins are typically found around the continental shelf edge and steep upper sections of the slope (>328 feet in depth) (Davis et al. 2002; NMFS 2008). Because of the relatively shallow depth of 73 feet at the project location and the

established ranges and depths that the majority of the cetaceans occupy, it is not anticipated that these species would be encountered in the project area during construction.

Of the five listed endangered whale species (sperm whale, sei whale, fin whale, blue whale, humpback whale), only the sperm whale is considered to commonly occur in the Gulf of Mexico. The sperm whale is predominantly found in deep ocean waters, generally deeper than 3,280 feet, on the outer continental shelf. Due to the relatively shallow depth of 73 feet in the project area, the sperm whale, or any other endangered whale, is not likely to be present during the deployment of the materials.

The West Indian manatee has been observed in Texas waters; however, sightings are very rare and almost always occur in the coastal bays and estuaries. Manatees, which tend to stay near the shoreline, are not expected to be encountered in the project area, which is 9 miles offshore. Because the FWS concurred that the project would not affect West Indian manatee under the ESA, the Trustees determined that no take of manatee under the MMPA would occur.

### ***Environmental Consequences***

Project deployment would have minor short-term impacts to protected species and their habitats in the areas where the reef materials would be placed. Short-term minor impacts may occur if species using the project area are temporarily disturbed. Long-term impacts would be beneficial with the addition of hard substrate that would support a more diverse community of benthic organisms and fish. The avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

At the conclusion of the ESA consultation, NMFS concurred that the project is not likely to adversely affect federally-listed sea turtles (NMFS 2014a). The project area is not located within designated Gulf sturgeon critical habitat (68 FR 13370, March 19, 2003), nor proposed loggerhead sea turtle critical habitat (78 FR 43005, July 18, 2013). As part of the Endangered Species Act consultation, no best management practices were identified. However, project implementation will adhere to NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions (2006), The Texas Artificial Reef Fishery Management Plan (TPWD 1990), the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NOAA Fisheries 2007).

While most motile fauna such as crab, shrimp, and finfish have the ability to avoid the area during the sinking process, this project will permanently displace a small portion of the existing natural soft bottom and sand habitat within the project area. This project would result in a minor long-term impact to marine soft bottom EFH by covering it with reef pyramid structures and effectively converting the naturally occurring soft bottom to artificial hard bottom substrate. Soft bottom habitat is very abundant in the Gulf of Mexico whereas hard bottom habitat acreage is much more limited. The relative abundance of soft bottom habitat within and surrounding the project area would not be significantly impacted due to the small footprint of each pyramid (10-foot by 10-foot by 10-foot) and the anticipated 20-foot spacing between the pyramids. The conversion from soft bottom habitat to hard bottom

substrate would be considered a habitat trade off by providing new hard structures to be colonized by encrusting marine organisms.

NMFS concurred with the EFH assessment for the project, which determined that temporary and localized turbidity impacts and permanent impacts to soft bottom EFH would occur; however, the creation of new hard structure in the Gulf may also create benefits to some species managed under the Magnuson-Stevens Act by providing foraging habitat, cover, and conditions favorable for encrusting benthic colonization (NMFS 2014d).

The Corpus Artificial Reef site is located at a depth of around 73 feet. Typically marine mammal species in the Gulf are found in deeper waters on the outer continental shelf or along the shelf break; therefore, they would not be impacted during the deployment of the material and no incidental take of marine mammals is anticipated. Deployment of the reef materials would be short in duration (10 days) and materials would be lowered slowly, providing fish and wildlife opportunity to leave the reef deployment area. Impacts would be avoided via management guidelines and techniques as appropriate. During reef deployment, a monitor would be present that would be able to halt work if sea turtles, smalltooth sawfish, whales, or other federally protected species are in the project area. Work would be halted until such time as the area is deemed safe to continue the operation (i.e., species have left the area). Additionally, the Sea Turtle and Smalltooth Sawfish Construction Conditions would be followed (NMFS 2006).

#### **8.9.6.3 Human Uses and Socioeconomics**

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

##### **8.9.6.3.1 Socioeconomics and Environmental Justice**

###### ***Affected Resources***

There are over 1.2 million saltwater recreational anglers in Texas. A 1995 study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs (Ditton et al. 1995). Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs each year. Trips to artificial reefs accounted for 40% of the total number of offshore trips.

Commercial shrimping is a highly productive industry within the Gulf of Mexico. The Texas shrimp fishery is one of the most valuable and one of the largest seafood industries in the United States. TPWD sells about 3,500 commercial shrimp boat licenses and about 600 non-commercial shrimp trawl licenses each year. Texas commercial landings exceeded 27.7 million pounds of shrimp in 2010, worth more than \$91 million to the commercial fishermen (<http://www.tpwd.state.tx.us/fishboat/fish/commercial/comland.phtml>). Preliminary data on shrimping frequency indicates a high level of shrimping occurs in the Gulf of Mexico waters in the vicinity of the proposed area (Culbertson et al. 2004). One study



reported that shrimping intensities in the western Gulf of Mexico were highest near shore and tapered off gradually at deeper depths (McDaniel et al. 2000).

There are oil and gas platforms, leases, pipelines, and a shipping fairway within a 5-mile radius of the Corpus Artificial Reef Project; however, there would be no negative impacts to the exploration and production of oil and gas. The project is not located near any Department of Defense danger zones. The Texas Artificial Reef Plan requires that artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline, nor in prohibited areas and danger zones designated by the U.S. Department of Defense. The reef area would be added to the NOAA navigation charts and a lighted buoy is already in the permitted reef area. Typically, fishermen avoid known hazards that can snag nets to reduce potential damage to equipment and vessels.

### ***Environmental Consequences***

Because this project is located offshore, it would have no negative impacts on the socioeconomic status of the communities and counties adjacent to the Corpus Artificial Reef Project. There would be indirect beneficial effects to the local economy due to increased fishing opportunities provided by the artificial reef. Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. Given the demand for fishing on artificial structures, the creation of Corpus Reef would help increase recreational opportunities. In turn, this is anticipated to increase sales of bait and supplies, boat launch fee revenue, harbor occupancy, fuel, charter boats, diving equipment and more. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The project would benefit the local economies adjacent to the project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. Commercial fishermen notate obstructions on navigation charts or GPS waypoints to avoid snags and potential damage to equipment and vessels. Overall, socioeconomics would not be adversely impacted as a result of the proposed project. The project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with increased fishing opportunities and tourism.

### **Environmental Justice Analysis**

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population

The Trustees find that this project location does not meet any of the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. There is not a minority or low-income population in the impact zone – the Gulf of Mexico, 11 miles

offshore, is uninhabited. Furthermore, there are no adverse effects to low income or minority populations anticipated from the proposed project.

#### 8.9.6.3.2 Cultural Resources

##### ***Affected Resources***

There are no known historic or prehistoric sites in the permitted reef area. A high-resolution geophysical survey was conducted in December 2013 to ensure that no historically or culturally significant areas would be impacted during the deployment of the artificial reef materials. The data collected during the survey was assessed for evidence of high probability areas for prehistoric occupations and shipwrecks. The evaluation of the high-resolution geophysical survey data from a survey conducted within the project area indicates that there were no landforms identified within the survey area that could be considered as high probability areas for prehistoric occupations. There were no other unusual depressions, scours, sediment changes, unidentified magnetic anomalies or unidentified seafloor targets observed within the survey area that could represent unidentified shipwreck remains.

##### ***Environmental Consequences***

It is possible that historic shipwreck materials may not be detected by the geophysical instruments or may be obscured by modern debris. If wooden planking or other cultural materials that could represent shipwreck remains are encountered, field operations would cease and a representative from the Texas Historical Commission would be contacted to provide further guidance. If any culturally or historically important resources are identified during project preparations or pre-deployment surveys, such areas would be avoided during deployment of the pyramid structures. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

#### 8.9.6.3.3 Land and Marine Management

##### ***Affected Resources***

The project area is located approximately 9 miles offshore of Nueces County, Texas on state-owned submerged lands. TPWD obtained a USACE permit (SWG-2010-01407) for the Corpus Artificial Reef Project under Section 10 of the Rivers and Harbors Act and under Section 404 of the Clean Water Act in May 2011. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

TPWD obtained a lease for the use of state owned submerged lands from TGLO and would follow the requirements of the lease to avoid impacts to critical areas, not interfere with public navigation channels,

and would avoid impacts to coastal waters. Additionally, the lease requires that the project meet the clearance and distance from shipping lanes, safety fairways, and anchorages requirements as established by the USACE and the USCG. A USCG approved marker buoy is already installed at the Corpus reef site and will be maintained per USCG requirements.

TPWD created the Artificial Reef Program in 1990 after the Texas Legislature passed the Texas Artificial Reef Act in 1989. The program establishes artificial reefs to create reef fishery habitat and enhance commercial and recreational fishing opportunities in state and nearby federal waters. The Texas Artificial Reef Fishery Management Plan (TPWD 1990) guides the decision-making process for selecting reef sites and materials, and defines parameters for prioritizing areas for reefs. TPWD's Artificial Reef Program also follows guidance in the Guidelines for Marine Artificial Reef Materials (Atlantic and Gulf States Marine Fisheries Commissions 2004), The Texas Public Reef Building Program Standard Operating Protocol and Guidelines (TPWD 2012b), and the National Artificial Reef Plan (as Amended): Guidelines for Siting, Construction, Development, and Assessment of Artificial Reefs (NMFS 2007) when constructing artificial reefs. The proposed Corpus Artificial Reef Project meets the requirements of the Texas Artificial Reef Act as well as the goals and priorities of the Texas Artificial Reef Fishery Management Plan as well as the National Artificial Reef Plan.

#### ***Environmental Consequences***

The Corpus Artificial Reef Project would be located offshore, and would not be subject to zoning, land use planning, or land developments plans. The Texas Artificial Reef Fisheries Management Plan requires that the project not be located within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline; therefore, it would not have any impacts to the oil and gas production facilities and pipelines in the area of the project. In addition, the project is located greater than 2 miles from the designated shipping fairway and would comply with the USACE and USCG requirement of a minimum of 50 feet clearance above the reef. Therefore, land and marine management would be unaffected by the Corpus Reef Project.

#### **8.9.6.3.4 Aesthetics and Visual Resources**

##### ***Affected Resources***

Reef materials would be loaded onto a boat or barge and transported offshore. The artificial reef materials would be placed on the ocean floor and would not be visible from the surface or shore. The reef is already identified by a yellow 10-foot spar buoy with a flashing light and TPWD decals.

##### ***Environmental Consequences***

The use of barges and large equipment could have a temporary visual impact during the time of project implementation. The deployment time would be short and therefore any visual impacts would be short in duration as well. The artificial reef would be placed on the ocean floor and would not be visible above the surface. The lighted buoy is already in place and therefore would not introduce a new visual component to the area. After completion, visual impacts would be limited to boat traffic. Increased boat traffic caused by anglers traveling to the reef would be consistent with the surroundings or designated uses. The boats would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Therefore, the Corpus Artificial Reef Project is expected to have only minor short-term impacts on aesthetics and visual resources.

#### 8.9.6.3.5 Tourism and Recreational Use

Artificial reefs enhance the fishing opportunities for hook-and-line anglers targeting fish associated with artificial reefs. There are over 1.2 million saltwater recreational anglers in Texas. One study found that of all Texas saltwater fishermen, 47% (564,000) fish within the Gulf of Mexico from a boat and approximately 300,000 - 400,000 anglers fish at offshore platforms or artificial reefs. Party boats take about 10,335 customers offshore to local Texas reefs and 35,724 offshore to all artificial reefs (Ditton et al. 1995). Trips to artificial reefs accounted for 40% of the total number of offshore trips.

##### ***Environmental Consequences***

The size of the Corpus Artificial Reef Project and the ability to only work in a small portion of the reef site at a time should help to minimize impacts to any recreational activities occurring nearby. Recreational and commercial fishing boats may be in the area during deployment. Any boats in the area would be coordinated with prior to the deployment of any materials to ensure safety of everyone in the vicinity. The nearest access point is Packery Channel which is 11 miles to the west. Each channel is serviced by public boat ramps, marinas, and harbors, which makes the project very accessible to the public. In addition, during the scoping meetings conducted by TPWD, numerous constituents related the need for more artificial reefs in Texas waters to enhance offshore fishing for smaller vessels. Given the demand for fishing on artificial structures, the expansion of the Corpus reef would increase recreational fishing opportunities. In turn, this project is anticipated to increase sales of bait and supplies, boat launch fee revenue, and harbor occupancy. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Anglers would be able to fish around the area during deployment of the pyramids. Therefore, no adverse impacts to tourism and recreational use are anticipated. The project should result in beneficial impacts to tourism and recreational uses over the long-term.

#### 8.9.6.3.6 Infrastructure

##### ***Affected Resources***

The project area is located approximately 9 miles offshore of Nueces County. The project area is located in around 73 feet of water and is permitted for a 50-foot clearance to ensure that it would not impede boat traffic. The Corpus Artificial Reef Project is located about 7 miles from the Aransas Pass Anchorage area. The reef area is about 3 miles to the closest shipping fairway, approximately 0.63 miles to the nearest oil and gas pipelines, and about 13 miles to the nearest platform.

The Texas Artificial Reef Fisheries Management Plan requires that all artificial reefs not be placed within 1,640 feet of an existing oil or gas production platform or within 774 feet of a pipeline.

##### ***Environmental Consequences***

The Corpus Artificial Reef Project would not impact the existing shipping lanes, fairways or oil and gas production facilities or pipelines. All navigation safety measures would be followed. Therefore, infrastructure would be unaffected by this project.

#### 8.9.6.3.7 Public Health and Safety and Shoreline Protection

##### ***Affected Resources***

The Corpus Artificial Reef Project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All occupational and marine safety regulations and laws would be followed to ensure safety of all workers and monitors. During construction of the predesigned concrete pyramids, the Guidelines for Marine Artificial Reef Materials would be followed and the materials would be stable, durable, and complex, and would be clean and free of any hazardous substances. The permitted reef area is located approximately 9 miles offshore and not in an area that would impact shoreline erosion. The project deployment would use mechanical equipment boats, and barges that use oil, lubricants, and fuels.

##### ***Environmental Consequences***

Because of the nature and location of the Corpus Artificial Reef Project, no impacts to public health and safety, or shoreline erosion are anticipated as a result of the construction of the reef or the reef itself. No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. No adverse effects to public health and safety and shoreline projection are expected as a result of this project.

#### 8.9.7 Summary and Next Steps

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Corpus Artificial Reef Project would increase the amount of reef materials in an artificial reef site which is permitted for 160 acres, but only has materials in the northwest quadrant and in the center of the permitted area. The project would place predesigned concrete pyramids in the about 115 acres of the remaining portions of the 160-acre permitted area. The project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance recreational fishing opportunities. The Trustees have started coordination and reviews under the National Historic Preservation Act and other federal statutes, where

appropriate. The Trustees have completed consultations and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.



## 8.10 Sea Rim State Park Improvements: Project Description

### 8.10.1 Project Summary

Sea Rim State Park is located along the upper Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas. The proposed Sea Rim State Park Improvements project would construct two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station, and one fish cleaning shelter in the Park (Figure 8-20). These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this project is \$210,100.



**Figure 8-20. Location of the proposed improvements within Sea Rim State Park.**



### 8.10.2 Background and Project Description

The proposed Sea Rim State Park project will restore and improve recreational facility infrastructure to enhance recreational access and opportunities on the Texas coast. Sea Rim State Park, which includes 4,141 acres of marshland with 5 miles of beach shoreline, is located in Jefferson County, Texas, southwest of Port Arthur (Figure 8-21). Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. White and brown shrimp, crabs, and various sport fishes, such as red drum, speckled trout, and flounder, thrive in the park's lakes and bayous. It is in an excellent location for recreational activities involving natural resources, including bird/wildlife watching, fishing, boating, camping, beach going, etc. Currently, visitors to Sea Rim State Park are required to be self-sufficient because much of the Park's infrastructure was damaged by Hurricanes Rita (2005) and Ike (2008). To guide the restoration process, TPWD started a master planning process in 2010 to identify appropriate restoration efforts for the Park. Amenities proposed by this project are consistent with the goals identified during the planning process and will help improve and enhance recreational opportunities along the Texas coast. Specifically, the Sea Rim State Park project includes construction of two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station (vault toilet), and one fish cleaning shelter in the Park. The goals of biological conservation balanced with recreation opportunity will be supported by:

- Producing a new development footprint no larger than the original;
- Minimizing the losses of wetlands that experience surface inundation;
- Minimizing the losses of dunes over 6 feet in elevation; and
- Using sustainable construction methods to create energy efficient structures.



Figure 8-21. Location of Sea Rim State Park.

The Fence Lake viewing platform will provide wildlife viewing opportunities accessible by kayaks and other shallow draft boats. The platform, located in open water in Fence Lake, will have a vessel docking area and a raised platform to provide visitors a high vantage point to see above the nearby tall shoreline vegetation.

The Willow Pond viewing platform and associated boardwalk will provide access to existing infrastructure to help improve viewing opportunities in coastal vegetation and wetland habitats. The new boardwalk will connect to a previously constructed section of boardwalk that is currently isolated and not accessible due to damage from recent hurricanes.

The comfort station will be constructed near the Park's boat ramp and will be similar to other pre-fabricated comfort stations used in Texas State Parks. The comfort station will have two restrooms and is intended to serve day-use visitors who are accessing the trails and/or using the boat ramp (Figure 8-22).



**Figure 8-22. Example of a comfort station (vault toilet).**

The fish cleaning shelter will be located on the beach side of the Park within and adjacent to the equestrian parking lot. This facility will improve experiences for anglers by allowing them to process their catch on site (Figure 8-23).



**Figure 8-23. Example of a fish cleaning station.**

### 8.10.3 Evaluation Criteria

This proposed Sea Rim State Park project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The project would enhance the public's use and enjoyment of natural resources, helping to offset a portion of the adverse impacts to such uses caused by the Spill. Creating the proposed infrastructure (viewing platforms, comfort station, and a fish cleaning shelter) will provide visitors increased opportunities for viewing wildlife while also maintaining sanitary conditions during the users' fishing and personal activities. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement).

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.10. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the BMPs and measures to avoid or minimize impacts described in Section 8.10 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation, operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1)). Developments proposed by this project are consistent with the goals identified during the master planning process and will help improve and enhance recreational opportunities along the Texas coast. As a result, the proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3) and Sections 6e of the Framework Agreement).

To ensure the opportunity for community participation, public comments were acquired during the master planning process through a public meeting (held in April 2010 in Port Arthur, Texas), personal conversations, and emailed letters. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Sea Rim State Park.

Recreational use projects in general and this specific project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

### 8.10.4 Performance Criteria, Monitoring and Maintenance

This Sea Rim State Park project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to construct two wildlife viewing platforms (Fence Lake and Willow Pond), one comfort station, and one fish cleaning shelter in Sea Rim State Park to enhance recreational use of the Park.

Performance criteria for this project will include a determination of successful construction of the project according to design to ensure that the opportunity for recreational use of the Park will be enhanced. Monitoring efforts will also be implemented to ensure that the project is constructed in

accordance with construction documents. The State Park currently has visitation monitoring procedures to capture the number of daytime visitors, overnight visitors, and participants in interpretive programs. This information will be collected and shared annually to document performance monitoring of the project for 5 years after construction completion.

Ongoing maintenance of the constructed facilities would be the responsibility of Sea Rim State Park, which is owned and managed by the TPWD.

#### 8.10.5 Offsets

The Early Restoration benefits provided by the project, also known as NRD Offsets, are \$420,200 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill.<sup>39</sup> This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

#### 8.10.6 Cost

The total estimated cost to implement this project is \$210,100. This cost reflects estimates developed from the most current information available to the Trustees at the time of the project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.

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<sup>39</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

## **8.11 Sea Rim State Park Improvements: Environmental Review**

Sea Rim State Park is located along the upper Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas. The proposed Sea Rim State Park Improvements project would build two viewing platforms, a comfort station (vault toilet), and a fish cleaning shelter. These improvements would enhance opportunities for visitor use and enjoyment of Park resources. The estimated cost for this project is \$210,100.

### **8.11.1 Introduction and Background**

Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing and diving, beach use, camping, and wildlife viewing. Creating the proposed infrastructure (viewing platforms, comfort station, and a fish cleaning shelter) would provide visitors increased opportunities for a portion of these recreational activities while also maintaining sanitary conditions during the users' fishing and personal activities.

To guide the restoration process for the Park, TPWD started a master planning process in 2010 to identify appropriate restoration efforts. To ensure the opportunity for community participation, public comments were acquired during the master planning process through a public meeting (held in April 2010 in Port Arthur, Texas), personal conversations, and e-mailed letters. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Sea Rim State Park. Amenities proposed by this project are consistent with the goals identified during the master planning process and would help improve and enhance recreational opportunities along the Texas coast.

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including, but not limited to, the Texas Coastal Management Program, and compliance with federal requirements, including the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act, would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

The permit application (SWG-2013-00686) for the Fence Lake viewing platform was approved by the USACE in a letter of permission pursuant to Section 10 of the Rivers and Harbors Act on January 22, 2014. TPWD submitted a permit application for the Willow Pond viewing platform and boardwalk to the USACE in April 2014.

Sea Rim State Park is operated by the TPWD, whose mission includes protecting, enhancing and increasing recreational opportunities throughout the state. The Sea Rim State Park Improvements project meets TPWD's objectives by increasing access to and participation in outdoor recreational opportunities. The agency's mission and objectives are described in detail in TPWD's Land and Water

Resources Conservation and Recreation Plan (2013b). In addition, Sea Rim State Park will follow guidance described in the State Parks Division Operating Plan (TPWD 2012a).

The TPWD regulations at Title 31, Texas Administrative Code (TAC) Chapter 59 govern the health, safety and protection of persons and property in state parks, historic sites, scientific areas, or forts, including encompassed waters, under the control of the TPWD. Implementation of the proposed project would follow the TPWD regulations, including the State Park Operational Rules at 31 TAC Chapter 59, Subpart F (Sections 59.131 to 59.136). The TPWD State Park Division also follows Division procedures established in 2010 and revised in 2012 for exotic, feral, and nuisance animal control.

All improvements would comply with Americans with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards as well as federal, state, and local law concerning construction standards and building codes to protect public health, safety, and welfare.

#### **8.11.2 No Action**

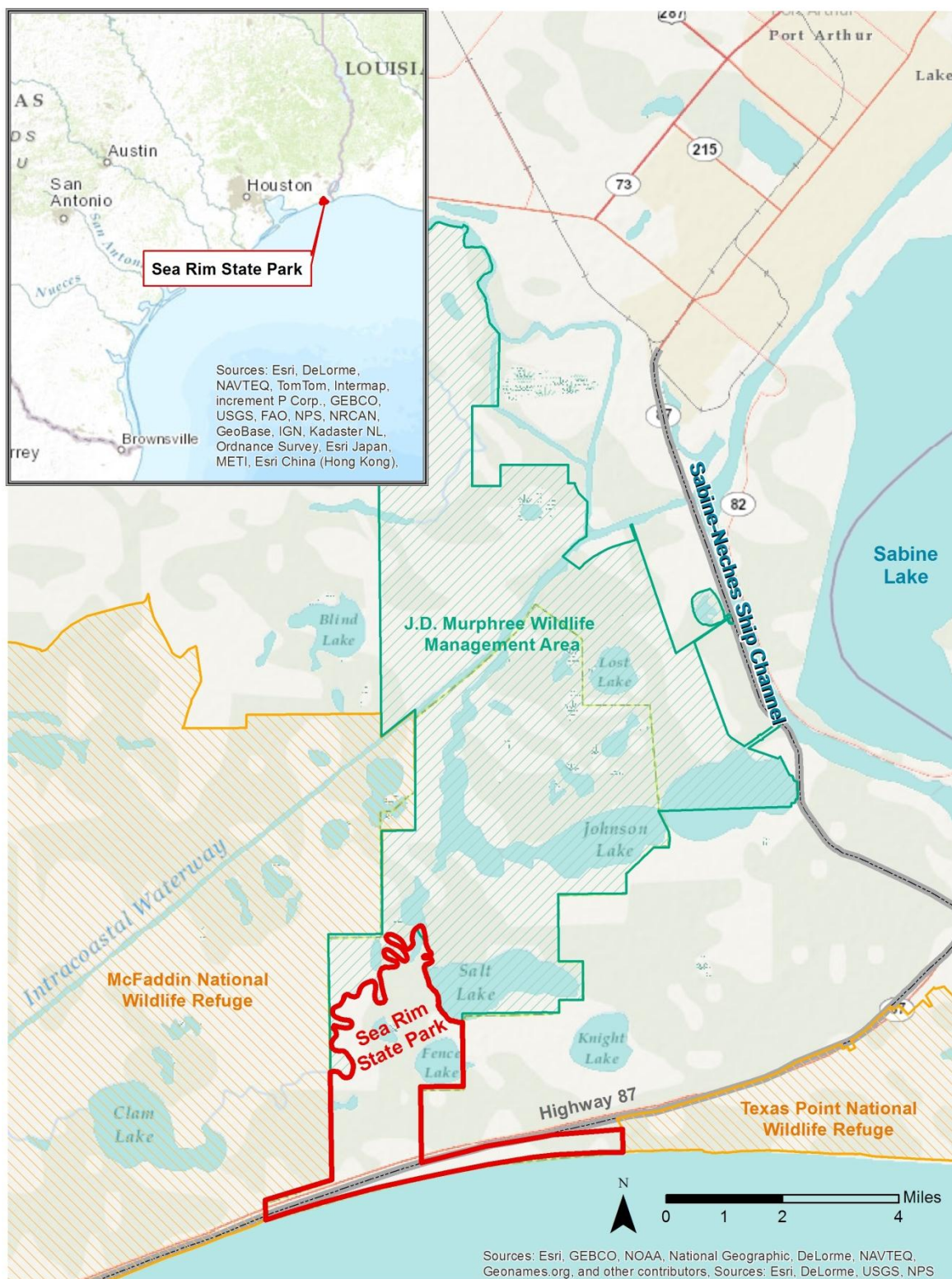
Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Sea Rim State Park project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

#### **8.11.3 Project Location**

Sea Rim State Park is located along the northern Texas coast in Jefferson County, Texas, southwest of Port Arthur, Texas (Figure 8-24). The Park consists of 4,141 acres of marshland and 5 miles of beach shoreline in the western portion of the Chenier Plain. The Park is surrounded by state and federal wildlife management areas and refuges (J.D. Murphee Wildlife Management Area, McFaddin National Wildlife Refuge, and Texas Point National Wildlife Refuge). Highway 87 divides the beachfront portion of the Park from much of the marshland areas and lakes, including Fence Lake. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes, and dune swale wetlands that abut the Gulf of Mexico.





**Figure 8-24. Location of Sea Rim State Park, chain of local canals and lakes, J.D. Murphree Wildlife Management Area, McFaddin National Wildlife Refuge, and Texas Point National Wildlife Refuge.**



Fence Lake, a tidally influenced shallow lake, is located on the northeast section of the Park, north of Highway 87 (Figure 8-24). Fence Lake is shallow (2-3 feet deep) and is connected to the Sabine-Neches Ship Channel and Sabine Lake (a major bay) through an 11-mile chain of canals and smaller lakes. The proposed viewing platform would be located on the southern end of Fence Lake.

The proposed Willow Pond viewing platform and associated boardwalk would be located on the Gulf (southern) side of Highway 87 within in the beach/dune system that consists of saline prairie and isolated small wetland habitats (Figure 8-20 and Figure 8-24).

The proposed comfort station would be located in an existing parking area near a boat ramp north of Highway 87 (Figure 8-20 and Figure 8-24).

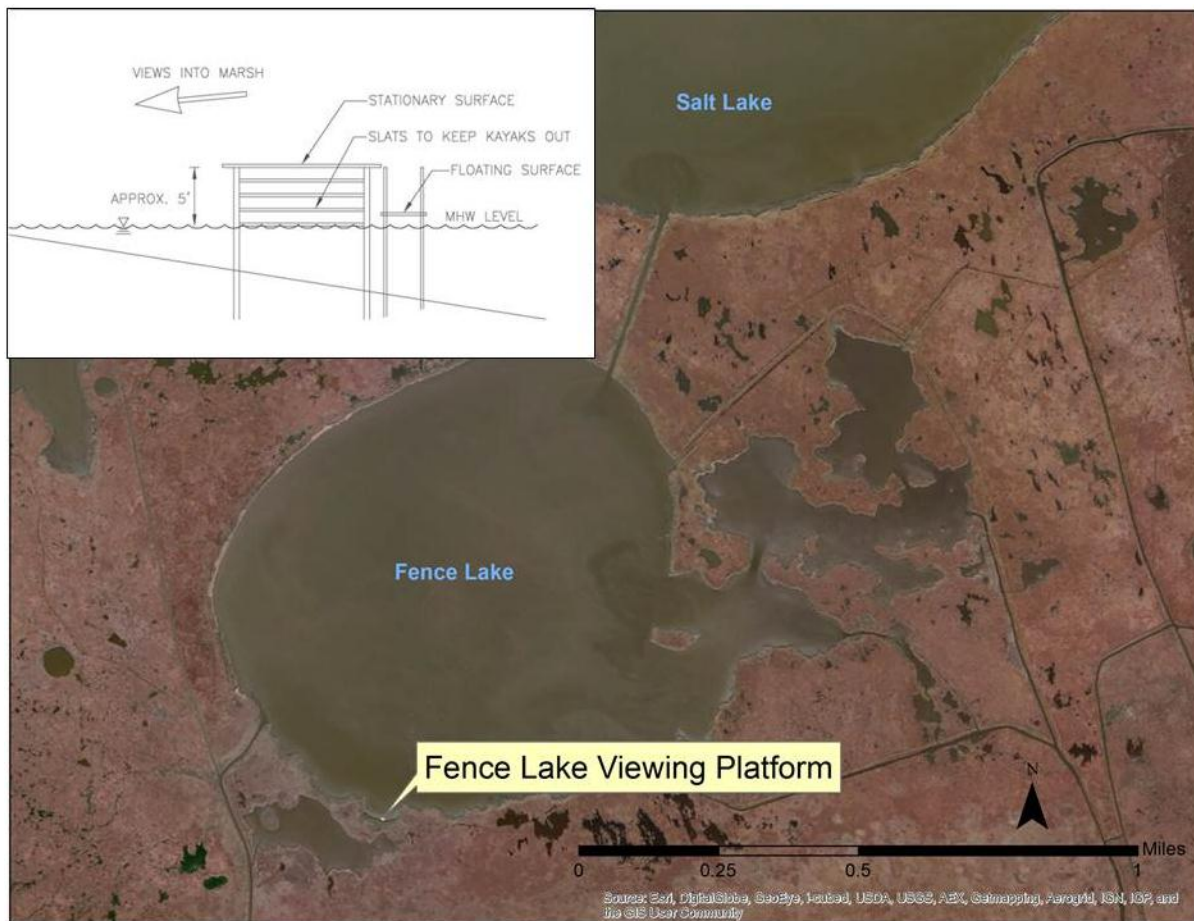
The proposed fish cleaning shelter is also located on the Gulf (southern) side of Highway 87 within the beach/dune area and is adjacent to existing infrastructure and a parking lot (Figure 8-20 and Figure 8-24). The construction area abuts a small wetland area.

#### **8.11.4 Construction and Installation**

The proposed improvements are located in different places within the Park. The combined improvement footprint and construction limit for all four improvements would impact less than 0.5 acres of the existing Park (400 sq. feet at Fence Lake, 6,300 sq. feet at Willow Pond, 2,300 sq. feet at the comfort station, and 2,700 sq. feet at the fish cleaning shelter). To the extent feasible, new facilities would be located within the pre-existing Park footprint. This project is still in the design phase and modifications may occur as the engineering designs become finalized.

##### **8.11.4.1 Fence Lake Viewing Platform**

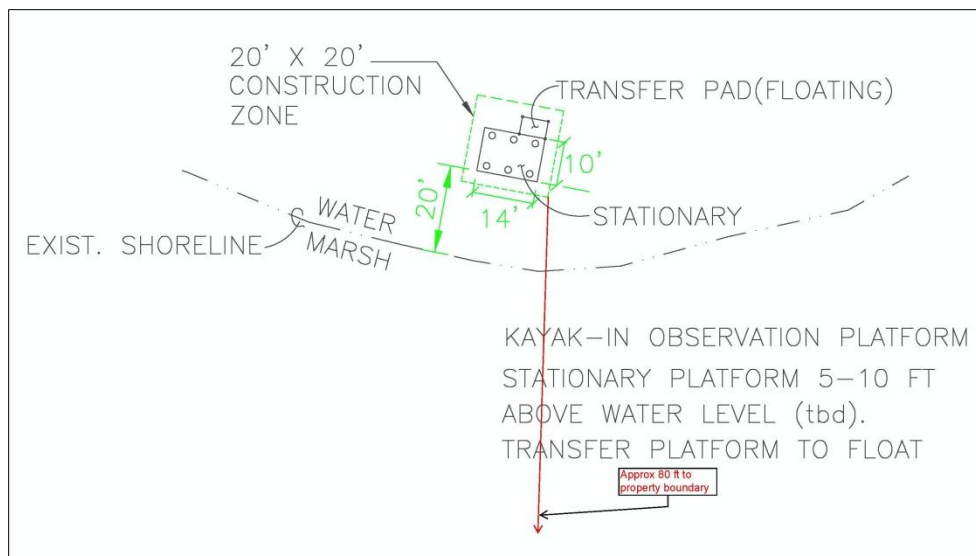
Fence Lake is located to the north of Highway 87 and is connected to an existing boat ramp via a canal. The viewing platform, to be sited in a small cove on the southern shore of Fence Lake, would consist of a 10-foot by 14-foot raised, fixed platform and an adjacent 6-foot by 4-foot floating platform. The smaller floating platform would be equipped with cleats to tie off boats and would serve to facilitate passengers exiting boats and accessing the raised platform. Users would reach the fixed platform via a ladder adjacent to the floating platform. The additional height on the fixed platform would provide visitors a high vantage point to see above the nearby tall shoreline vegetation. The preliminary engineering design is shown below (Figure 8-25). Conceptually, there would be six pilings supporting the fixed platform. Pilings would likely be steel pipes or treated wood and they would measure approximately 12 inches and be spaced 5 feet lengthwise and 7 feet crosswise. Platform materials would likely consist of composite decking, fiberglass reinforced polypropylene, or a grate decking system from a manufacturer. Spacing of the decking would comply with Americans with Disabilities Act Accessibility Guidelines and Texas Accessibility Standards and would allow for light penetration.



**Figure 8-25. Location of the viewing platform on Fence Lake and the preliminary platform design.**

### **Grading and Ground Disturbance**

A 20-foot by 20-foot construction zone would be established around the worksite, which would be on the water of Fence Lake (Figure 8-26). About six 12-inch by 12-inch pilings, depending on the final design, would be driven into the sediments of Fence Lake with the aid of moderate sized excavation equipment or pile drivers. The platform would be constructed on the pilings and a floating platform would be attached to the structure.



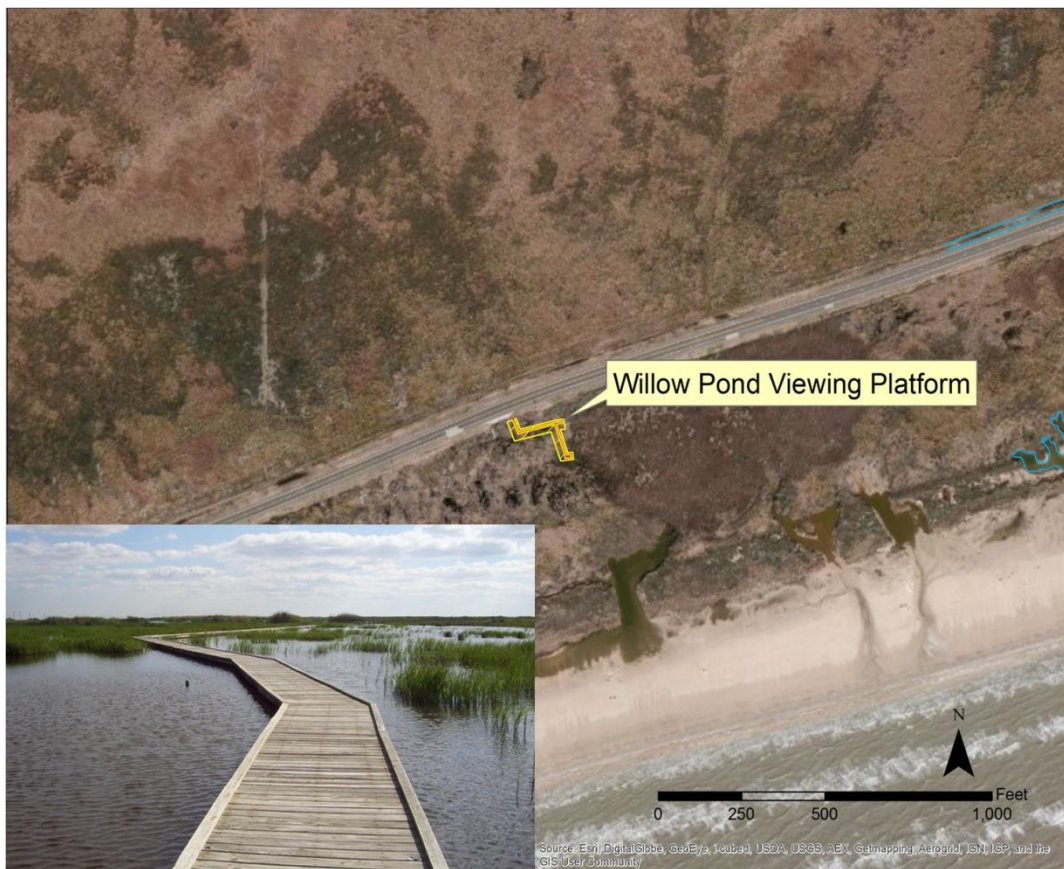
**Figure 8-26. Site plan for the Fence Lake viewing platform.**

### **Mobilization, Staging, and Stockpiling**

Materials would be transported to the worksite using an airboat or other marine vessel. Most materials would be transported in and out of the site daily. However, a small barge or other vessel would likely stay at the site adjacent to the work area. From the boat, equipment would be used to drive the pilings into the lake bed. After the pilings are set and stabilized, the platform would be constructed on top of the pilings.

#### **8.11.4.2 Willow Pond Viewing Platform**

The Willow Pond boardwalk and viewing platform would be located on the Gulf side (south) of Highway 87. The viewing platform would consist of a 16-foot by 8-foot observation platform which would be connected to a 5-foot wide, 235-foot long boardwalk. The boardwalk will be connected to an adjacent road and nearby parking area (Figure 8-27). Additionally, the boardwalk would also connect to a previously constructed section of boardwalk that is currently inaccessible.



**Figure 8-27. Location of the viewing platform and boardwalk on Willow Pond with an image of a boardwalk.**

### **Grading and Ground Disturbance**

The Willow Pond viewing platform would cause ground disturbance by placing support structures into the substrate. The maximum footprint of the construction area is anticipated to be 6,300 sq. feet (0.14 acres). A 20-foot construction zone (15 feet on one side and 5 feet on the other) around the boardwalk and platform would be established to allow access for construction personnel and equipment, and to limit the geographic scope of the impacts. Construction activities would include ingress and egress of construction equipment and workers, driving of pilings, and construction of the decking and associated structures.

### **Mobilization, Staging, and Stockpiling**

Existing roads and/or parking areas would be used to stage and stockpile materials for the Willow Pond platform and boardwalk. Materials can also be staged at the existing parking lot at the camping loop restroom until they are needed for construction. Equipment would include all-terrain vehicles, shredders, and a moderate sized rubber track compact radius excavator to drive the pilings for the boardwalk.



#### 8.11.4.3 Comfort Station

The comfort station would be constructed north of Highway 87 near the boat ramp and would be similar to other pre-fabricated comfort stations in Texas State Parks. The comfort station would have separate men's and women's restrooms and is intended to serve day-use visitors who are accessing the trails and/or using the boat ramp.

##### **Grading and Ground Disturbance**

Construction activities would occur on an existing asphalt parking lot and a grassy median which overlays approximately 4 feet of fill material (Figure 8-28). The construction area would extend approximately 10 feet from the walls of the structure and 5 feet from the sidewalks. Installation of the comfort station would include excavation of a 14-foot long by 6-foot wide by 8-foot deep hole to accommodate the pre-constructed sub-surface waste vaults.

##### **Mobilization, Staging, and Stockpiling**

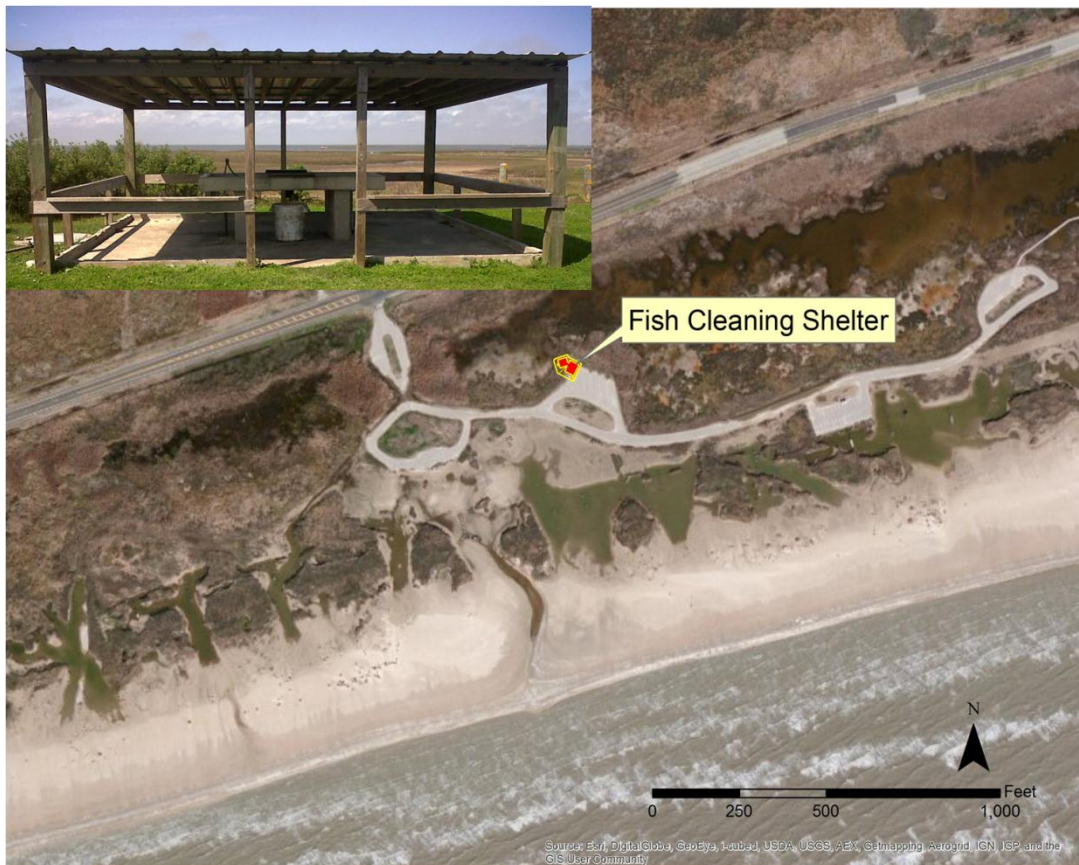
The existing parking lot would be used to stage construction materials. Construction equipment would consist of a backhoe, tractor trailer, and crane to prepare the site and place the station.



**Figure 8-28. Location of the comfort station.**

#### 8.11.4.4 Fish Cleaning Shelter

The fish cleaning shelter would be constructed north of an existing parking lot on the Gulf side (south) of Highway 87. The fish cleaning shelter would be located adjacent to the equestrian parking lot and is near the beach (Figure 8-29). The building slab would be designed so that water would drain into an adjacent gravel area to aid in cleaning the area (Figure 8-30). Solids would be captured by the perforated garbage hole in the cleaning table and then disposed of in the dumpster. Although this shelter would be replacing a temporary rinse shower that was built in 2011, it would still provide access to potable water for patrons on the beach side of the Park.



**Figure 8-29. Location of the fishing cleaning shelter with an example of a fish cleaning shelter.**

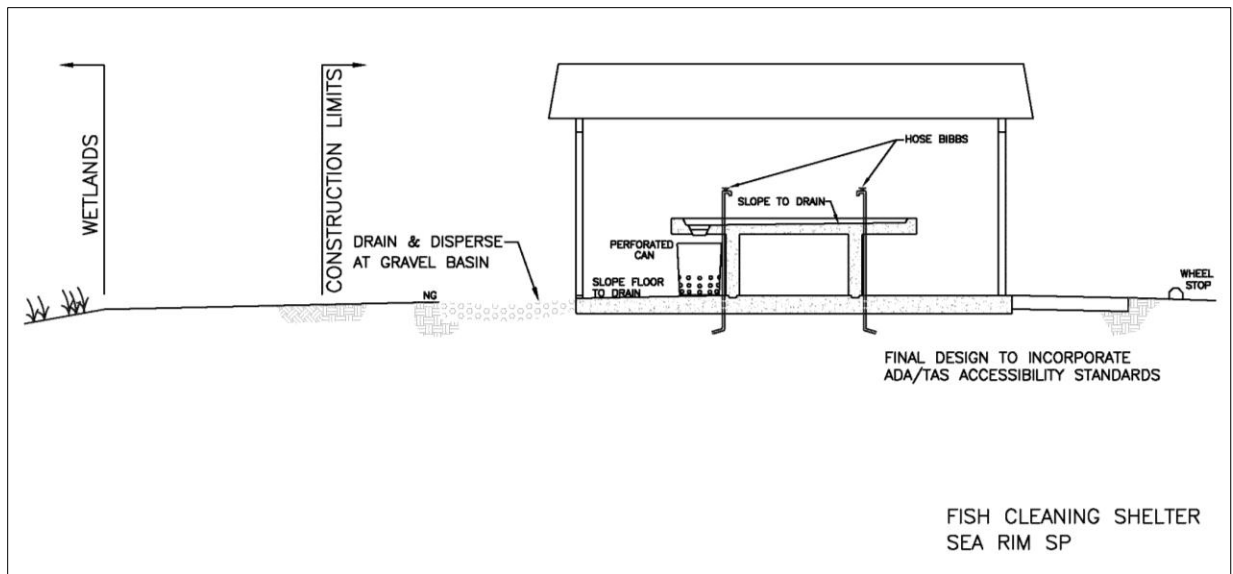


Figure 8-30. Preliminary design for the fish cleaning shelter.

### Utilities

The fish cleaning shelter would connect to the existing water supply that is currently being used for the temporary rinse shower.

### Grading and Ground Disturbance

The fish cleaning shelter would disturb both an area currently covered with asphalt and adjacent vegetation in order to construct proper flooring for the facility. The shelter would be about 15 feet by 17.5 feet (**Error! Reference source not found.**). The construction limits would be about 10 feet around the building and 5 feet surrounding the sidewalks.

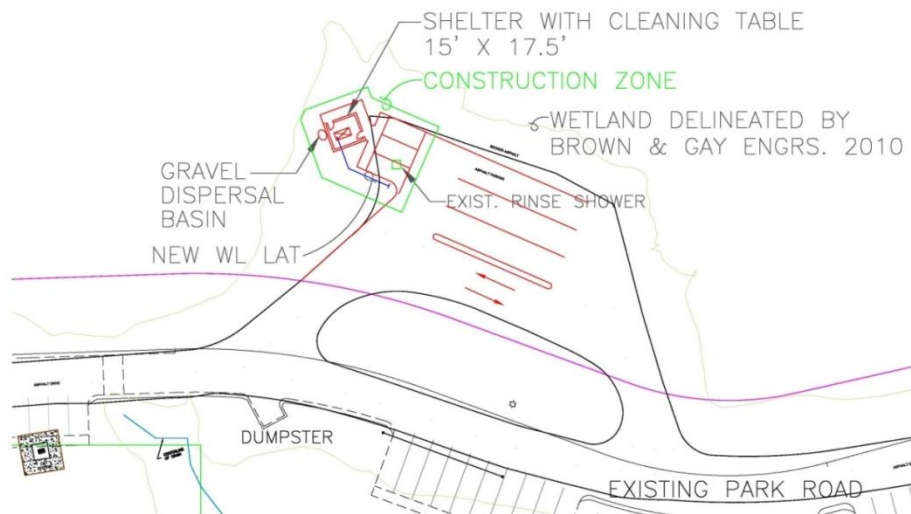


Figure 8-31. Site plan for the fish cleaning shelter and the location of existing development and environmental features.



## **Mobilization, Staging, and Stockpiling**

Adjacent roads and/or parking areas would be used to stage and stockpile materials for the shelter.

### **8.11.4.5 Construction Schedule for all Improvements**

Although a construction schedule has not yet been finalized, each improvement is expected to take fewer than 30 days to complete (30 days for Fence Lake, 25 days for Willow Pond, 20 days for the comfort station, and 25 days for the fish cleaning shelter). All construction would occur during daylight hours, Monday through Friday. The date the contract is awarded may impact the timing of the Sea Rim State Park project. Contracts awarded towards the end of the year (August – December) may not be completed until the following spring or early summer, depending on weather conditions.

### **8.11.5 Operations and Maintenance**

Sea Rim State Park is open 7 days a week year-round. Recreational activities available at the park include camping, wildlife observation, birding, beach combing, walking nature trails, canoeing, kayaking, beach swimming, fishing and waterfowl hunting. During hunting season, hunters are allowed in the Park no earlier than 4:30 a.m. Ongoing maintenance of the constructed facilities would be the responsibility of Sea Rim State Park, which is owned and managed by the TPWD. During construction, there would be monitoring efforts to ensure that wildlife and habitat is protected and that the Sea Rim State Park project designs are correctly implemented. Maintenance and other activities at the Park follow all guidance provided by the TPWD State Park Division Operating Plan (TPWD 2012a).

### **8.11.6 Affected Environment and Environmental Consequences**

The proposed Sea Rim State Park project has a small footprint and three of the items (comfort station, Willow Pond viewing platform, and fish cleaning shelter) are either being developed within the footprint of existing infrastructure or would be connected to existing infrastructure. BMPs would be used during construction to minimize impacts.

#### **8.11.6.1 Physical Environment**

Sea Rim State Park has lakes, bayous, canals, water control structures, emergent marshes, beaches and coastal uplands and is located within the Coastal Prairies physiographic region. Specifically, the project area is located within the Chenier Plain which formed over thousands of years from the reworking of Mississippi River delta sediments. The description of the physical environment of the project area is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

##### **8.11.6.1.1 Geology and Substrates**

###### ***Affected Resources***

Within the project area there are two geological zones: the gulf shore beach/dune zone and the brackish water wetlands and lakes zone. The gulf shore beach/dune zone consists of a thin layer of sand over clay deposits from the Sabine and Mississippi Rivers. The brackish water wetlands and lakes zone consist of clays overlaid with mucky peat formations which is consistent with backwater marsh deposits of silt and detritus that are common with tidally influenced wetlands. The Gulf shore on the upper coast of Texas has retreated several miles inland over the past millennia. In addition, the geology of the site continues to be altered by tropical storms and hurricanes. In the past 10 years, two major hurricanes, Hurricanes Rita (2005) and Ike (2008), significantly impacted the project area's geology. The dunes and

dune swale wetlands were severely impacted during Hurricane Ike, which altered the protective function of the beach/dune system and exposed the clay ridge to erosion.

Soils present throughout the project area have been characterized as being frequently flooded. However, the soil in the comfort station construction area was previously altered by the addition of fill. As a result, the area only floods during large storm events. Soils in the fish cleaning shelter construction area may flood, but the area is not considered a wetland. The Fence Lake viewing platform is located on submerged lands and the sediment consists of a soft, muddy bottom. Soils throughout the project area may have received a recent deposit of sand resulting from the over washing of the coastal dunes during Hurricanes Rita and Ike.

### ***Environmental Consequences***

Alterations to substrates through fill, compaction, grading, and earth moving activities would be limited to the local project areas and would not change the local geologic features or characteristics of the soil. There would likely be grading of the substrate in the comfort station and fish cleaning stations project area. Substrate at the comfort station is comprised of fill (up to 4 feet below the surface) and the surface mainly covered with exotic grasses and asphalt present as a result of previous developments. Both viewing platforms would have minimal disturbances associated with the installation of the structures. There may be minor impacts associated with the equipment used during the construction of the Willow Pond viewing platform. As a result, project implementation would likely have short-term and long-term minor adverse impacts to affected soils.

Specific impact minimization measures would be implemented during construction. These would include following established BMPs such as the implementation of an erosion control and storm water management plan, the installation of sediment traps prior to commencement of construction activities, operating outside of set-backs from wetland areas, and ongoing construction monitoring to ensure compliance.

### **8.11.6.1.2 Hydrology and Water Quality**

#### ***Affected Resources***

##### **Hydrology**

The specific project area is comprised of brackish lakes, emergent marshes and coastal uplands. The beach/dune system consists of small coastal dunes and dune swale wetlands that are supported by a hydrologic freshwater lens which is recharged by rainfall. Generally, the water in Fence Lake is turbid due to unconsolidated muddy bottom substrates and salinity averages around 10 parts per thousand or lower. In years where rainfall is high, salinity decreases which allows for the colonization by freshwater aquatic plants. The plants are able to stabilize the sediments and reduce turbidity in the lake. Recent storms have breached the beach ridge enabling saltwater intrusion and siltation into the adjacent brackish wetlands. Altered hydrology from such activities as construction of the Gulf Intracoastal Waterway and navigational channels has also caused significant increases in salinity which has caused land loss in marsh areas.

The proposed comfort station located at the boat ramp is surrounded by marsh that is tidally connected via a boat channel to Fence Lake. The Fence Lake viewing platform is located within the tidally

influenced Fence Lake. Fence Lake is then connected via tidal channels to Salt Lake, Salt Bayou, Johnson Lake, Keith Lake and finally to the Sabine-Neches Ship Channel, Sabine Pass and the Gulf of Mexico. Heavy rainfall in the vicinity of these projects could cause the water level to rise above normal elevations until the rainfall drains out of the system, which may take a week or more. Likewise, storm tides may inundate the area with gulf waters which would slowly drain away over a similar period of time.

The Willow Pond viewing platform and the fish cleaning station are surrounded by freshwater and brackish marshes that are hydraulically connected to the Gulf of Mexico. The Willow Pond viewing platform is located within a marshy low area between the beach dunes and an older dune ridge further inland upon which Highway 87 was built. Rainfall can build up enough to overflow directly into the Gulf of Mexico. Freshwater can also seep into the Willow Pond area from the surrounding landscape. Rainfall on the dunes soaks into the sand and into a freshwater lens that sits on top of a permanently saline water table. This fresh groundwater then seeps into Willow Pond which in turn seeps out into the Gulf or occasionally during storm events, opens directly into the Gulf and drains via a temporary surface connection.

The fish cleaning shelter is located on an upland dune ridge surrounded by brackish marsh. Rainfall quickly percolates into the sand of the dune ridge at and around the project site and then seeps out into the marsh similar to the manner described above. However, this marsh has a much larger watershed and it is connected to the Gulf of Mexico via a permanent tidal channel. This channel is blocked at its mouth during prolonged dry periods and most summer seasons when there is neither the freshwater drainage nor high enough tides to maintain water exchange over a low beach berm. During these times the marsh may become fresh, hyper saline, or completely dry dependent upon the amount of rainfall.

### **Water Quality**

Surface waters that flow into the project area meet their assigned water quality standards, except for bacteria. There are restricted consumption advisories in the Gulf of Mexico due to elevated levels of mercury in edible tissues of some tuna, jack, mackerel, shark, and bill fish species. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

### ***Environmental Consequences***

Sea Rim State Park project activities must comply with local, state, and federal hydrology and water quality requirements. The permit application (SWG-2013-00686) for the Fence Lake viewing platform was approved by the USACE in a letter of permission pursuant to Section 10 of the Rivers and Harbors Act on January 22, 2014. During the permit application review for the Fence Lake viewing platform, the USACE determined the activity will not result in any change to the base elevation within the floodplain (USACE 2014b). TPWD submitted the permit application for the Willow Pond viewing platform and boardwalk to the USACE in April 2014.

Construction may result in modifications to hydrology at the site. Natural hydrologic flows would be altered to some degree by the introduction of an impermeable surface for the comfort station and fish cleaning shelter. The impermeable surfaces could increase rates of runoff during storm events.

However, the increase in impervious surface area is small and therefore, any adverse impacts to hydrology would be short-term or long-term but minor.

Construction of the Fence Lake viewing platform may temporarily increase turbidity. However, the effects would be minor and localized, and expected to be short-term. Construction of the platform would not cause long-term adverse water quality impacts, nor would it alter the hydrology in the project area. Disturbance to the water quality and hydrology, if any, caused by construction of the Willow Pond platform and boardwalk would be small and localized, and short in duration. A permit application for the Willow Pond viewing platform and boardwalk was submitted to the USACE in April 2014. The fish cleaning shelter would be designed to collect all refuse and waste from the shelter, which would be disposed of in the waste collection system within the Park. The comfort station would have minor long-term beneficial impacts on water quality by containing waste in the vaults, which would be pumped out on a regular schedule. Where necessary, all runoff would be controlled with sediment fencing around the construction zone to reduce impacts to the adjacent wetlands. No other negative effects to water quality are expected. Therefore, any adverse impacts to water quality would be short-term and minor.

#### **8.11.6.1.3 Air Quality and Greenhouse Gas Emissions**

##### ***Affected Resources***

The project area is located within Jefferson County, Texas, which is currently in attainment with NAAQS for all criteria pollutants (EPA 2013).

Implementation of the Sea Rim State Park project would include transportation and heavy construction equipment, which may include airboats, tugboats/barges, trucks, forklifts, backhoes, semi-tractor trailer, front-end loaders, and a crane.

##### ***Environmental Consequences***

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the project vicinity due to construction vehicle emissions. Excavation associated with construction of portions of the improvements may produce fine particulate matter. However, this impact would be short-term, only occurring during active construction activities. Any air quality impacts that would occur would be localized and short in duration. Therefore, any adverse impacts to air quality would be short-term and minor.

Available impact minimization measures would be employed to reduce the release of GHG during project implementation. The following minimization measures have been identified to reduce or eliminate GHG emissions from the Sea Rim State Park project:

- Shut down idling construction equipment, if feasible;
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including airboats, trucks, front-end loaders, forklifts, cranes, backhoes, and tugboats/barges, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

Based on the assumptions described in the table above, and the small-scale and short duration of the construction portion of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

**Table 8-9. Estimated greenhouse gas impacts.**

EQUIPMENT <sup>40</sup>	NUMBER OF 8-HOUR DAYS	CO <sub>2</sub> e (METRIC TONS) <sup>41</sup>	CH <sub>4</sub> (CO <sub>2</sub> e) (METRIC TONS) <sup>42</sup>	NO <sub>x</sub> (CO <sub>2</sub> e) (METRIC TONS)	TOTAL CO <sub>2</sub> e (METRIC TONS)
<b>Sea Rim - Fence Lake Platform- 30 days</b>					
Airboat	30	39.00	0.06	0.30	39.03
Barge/tugboat <sup>43</sup>	15	240.00	0.45	1.80	242.25
Pickup truck	30	4.80	0.00	0.03	4.80
Semi-tractor trailer	10	3.40	0.00	0.02	3.40
<b>Sea Rim - Willow Pond Boardwalk &amp; Platform - 25 days</b>					
Pickup truck <sup>44</sup>	25	4.00	0.00	0.03	4.00
Semi-tractor trailer	5	1.70	0.00	0.01	1.70
Front-end loader	15	5.25	0.00	0.03	5.25
Rough terrain forklift	15	5.25	0.00	0.03	5.25
<b>Sea Rim - Comfort Station - 20 days</b>					
Pickup truck	20	3.20	0.00	0.02	3.20
Semi-tractor trailer	5	1.70	0.00	0.01	1.70
Front-end loader	15	5.25	0.00	0.03	5.25
Crane	1	0.29	0.00	0.00	0.29
<b>Sea Rim - Fish Cleaning - 25 days</b>					
Pickup truck	25	4.00	0.00	0.03	4.00
Backhoe	25	8.75	0.01	0.05	8.75
Semi-tractor trailer	15	1.70	0.00	0.01	5.10
Front-end loader	25	8.75	0.01	0.05	8.75
Crane	1	0.29	0.00	0.00	0.29
<b>TOTAL</b>		<b>337.04</b>	<b>0.53</b>	<b>2.45</b>	<b>343.01</b>

<sup>40</sup> Emissions assumptions for all equipment based on 8 hours of operation.

<sup>41</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>42</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>43</sup> Fuel economy assumptions for a 3000 hp marine diesel tug based on Walsh 2008.

<sup>44</sup> Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

#### 8.11.6.1.4 Noise

##### ***Affected Resources***

The primary sources of ambient (background) noise in the project area are operation of vehicles, humans, recreational vessels, and natural sounds such as wind and wildlife. The levels of noise in the project area varies, depending on the season, and/or the time of day, the number and types of sources of noise, and distance from the sources of noise. Noise-sensitive land users in the project area include Park users.

##### ***Environmental Consequences***

Implementation of the Sea Rim State Park project would include transportation of construction materials to the project area, which may include boats and a semi-tractor trailer truck or other types of transportation. The heavy equipment used for transportation and construction would produce noise. Construction equipment and pile driving noise is known to disturb fish and nesting shorebirds. Construction noise can also be a nuisance to visitors using the Park. Recreational users in the vicinity of the Fence Lake viewing platform and the fish cleaning platform would have the opportunity to relocate to other areas of the Park during construction activities. Noise should not inhibit recreation use in the vicinity of the comfort station project area since it is a parking area and boat launch. Few visitors are expected in the Willow Pond project area because there are currently no trails or walkways that provide access into the area. Although there are boardwalks in part of the project area, they do not connect to any existing infrastructure and a park patron would have to walk through the grasses and bushes to reach the boardwalk. Because construction noise is temporary and unlikely to result in users changing their activities, any negative impacts to the human environment during construction activities would be short-term and minor.

Once facilities are constructed, noise would be generated from facility operations, vehicles associated with these facilities, and recreational users. Overall, long-term noise effects from increased recreational activities and users would be minor, but consistent with the overall type and decibel level of a state park experience.

#### 8.11.6.2 Biological Environment

The Park includes 4,141 acres of marshland with 5 miles of beach shoreline in the western portion of the Chenier Plain. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes and dune swale wetlands abutting the shore of the Gulf of Mexico. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

##### 8.11.6.2.1 Living Coastal and Marine Resources

The Park includes 4,141 acres of marshland with 5 miles of beach shoreline in the western portion of the Chenier Plain. The dominant habitat type is tidally influenced brackish water marshes and lakes. In addition, the Park contains a stretch of sandy beach, dunes and dune swale wetlands abutting the shore of the Gulf of Mexico. Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway.

## ***Affected Resources***

### **Flora**

The Sea Rim State Park project consists of four separate improvements, located in different areas of the Park. The Fence Lake viewing platform site does not contain seagrass beds or hard substrates that would support corals or hard structure habitats. There is shallow lake bottom consisting of unconsolidated silts and clays. The shoreline vegetation of the lake is dominated by common reed. The Willow Pond boardwalk and viewing platform project area is within saline prairie and marsh habitat. Dominant vegetation at the Willow Pond viewing platform includes salt bush, high tide bush, American bulrush, saltmarsh mallow, salt cedar, and marsh hay cordgrass. A boardwalk and viewing platform is being built in the project area to minimize impacts to vegetation. Vegetation at the comfort station includes non-native turf grasses which are mostly comprised of Bermuda grass. Development of the comfort station would eliminate all vegetation in that project area. The fish cleaning shelter project area consists of a mix of non-native and native grasses and sedges. Plant species are dominated by Bermuda grass, bitter panicum, and American bulrush. A portion of the project footprint would be in an area with existing vegetation.

### **Fauna**

Wildlife that have been observed in Sea Rim State Park include but are not limited to the following: alligators, mink, nutria, raccoon, rabbit, opossum, skunk, river otter, muskrat, warblers, swallows, vireos, grosbeaks, buntings, and flycatchers. At dawn and dusk, bobcats and coyotes can sometimes be seen. White and brown shrimp, crabs, and various sport fishes, such as red drum, speckled trout and flounder, thrive in the Park's lakes and bayous. Rich with plankton and organic matter, the marshland waters serve as a nursery for various species of aquatic life, supporting marine fisheries and migratory waterfowl. Fish commonly found in Fence Lake includes striped mullet, mud minnows, pinfish, hardhead catfish, red drum, and sheepshead. Common crustaceans include blue crab, white shrimp, and grass shrimp.

### ***Environmental Consequences***

In order to minimize environmental impacts, the Willow Pond viewing platform, comfort station, and fish cleaning shelter would be located within previously disturbed/developed areas of the Park. The Willow Pond viewing platform would be connected to an existing boardwalk that was damaged from recent hurricanes. The fish cleaning shelter and comfort station would be built, in part, on an existing parking lot. In addition, all project areas are small and vegetation types to be impacted are common to the area. Therefore any short-term and long-term adverse impacts to vegetation would be minor.

To prevent any invasive species from becoming established during project construction, equipment, materials, and disturbed areas would be monitored for invasive species. If invasive species are observed, appropriate treatment methods will be used to remove them. In addition, if there is any revegetation following construction activities, only native species would be used. Currently, Sea Rim State Park does not anticipate any impacts from invasive species. However, the area would be monitored after construction activities have finished as part of the normal operations for State Parks. During the permit application review for the Fence Lake viewing platform, the USACE determined that the activity should not result in the introduction of invasive species (USACE 2014b).



Many mobile wildlife species would avoid areas near or within construction areas but would likely return to the area after construction activities cease. All project areas are small in size and construction activities would be short in duration (estimated to be less than 30 days per improvement). Any adverse effects to fauna would be short-term and minor.

#### **8.11.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the FWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act.

#### ***Affected Resources***

##### **Endangered Species**

No federally-listed species or other species of concern under the NMFS' jurisdiction are expected to be in the project area due to the Sea Rim State Park project location and habitat conditions. There is no designated or proposed critical habitat for federally-listed, proposed, or candidate species in the project area. None of the improvements would be constructed on the beach; therefore appropriate habitat for sea turtles does not exist in the project area.

The red knot and piping plover are the only proposed or federally-listed species that may be in the project area. Although piping plover (listed) and red knot (proposed) occur in the Park, habitat present in or adjacent to the project areas is considered marginal at best. Typically, red knots and piping plovers only use beach or shoreline habitat. Marginal habitat for the piping plover does exist near the fish cleaning shelter, which is located next to an existing parking lot that is already in use. The red knot has rarely been observed within the Park and is only known to be found on the beach. There are no improvements planned for the beach. Based on local knowledge and best professional judgment, appropriate habitat for the red knot does not exist in the project area.

##### **Bald and Golden Eagles**

There are no golden eagles present within Sea Rim State Park. On rare occasions bald eagles may nest within the Park; however, their nests would not be within or near the project area.

##### **Migratory Birds**

Located along the Greater Texas Coastal Birding Trail, Sea Rim State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. Migratory birds are also protected under the Migratory Bird Treaty Act. Nesting of migratory birds is not known within the project area, but is possible. Bird rookeries are not within or near the project area.

There are over 270 species of migratory birds that are present during at least part of the year at Sea Rim State Park. Of these species, only a few have the potential to nest within or near the proposed Sea Rim State Park Improvements project.

### **Essential Fish Habitat**

NMFS confirmed that no EFH as described by the Magnuson-Stevens Fishery Conservation and Management Act occurs in the project area.

### **Marine Mammals**

The Fence Lake viewing platform is the only development which would occur in open water. The Lake is extremely shallow (2-3 feet deep), isolated from direct access to adjacent bays, and is not known to be used by any marine mammals. No marine mammals are expected in the project area.

### ***Environmental Consequences***

It is possible that migratory birds may nest in the Sea Rim State Park project area. There is no mechanical clearing of vegetation with this project, but there would be enough disturbances to displace or destroy nests, eggs or chicks. Therefore, at least the initial site access, clearing, and construction effort would be conducted outside of the spring nesting season (March 15 to July 1). Once the site has been cleared and construction commenced, nesting birds would avoid the construction area and further work can occur throughout the year. Construction activities would produce enough noise and disturbance to prevent birds from nesting in the area, thereby preventing impacts to nesting birds.

The fish cleaning shelter is the only proposed improvement close to the beach. Therefore actions to minimize potential impacts to piping plovers will be taken during construction of the fish cleaning shelter. Actions to minimize impacts include having an onsite monitor, avoiding work after dark, maintaining a speed limit of 10 mph, and stopping work if the birds are observed foraging within 100 feet of the work site. The onsite monitor would have stop work authority and would be present at the site when construction is occurring near the fish cleaning shelter. The trained monitor would survey the area daily prior to the initiation of any construction activity and periodically throughout the day. If vehicles or equipment are left in the project area, the areas around the tires would be surveyed before moving the vehicle. The monitor would keep a daily log documenting all surveys conducted during the fish cleaning shelter construction project.

The ESA consultation has been completed. FWS concurred that the proposed project may affect, but is not likely to adversely affect piping plover and no effects to red knot are anticipated. The project was also reviewed for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Actions to minimize impacts will be implemented during project construction to prevent take of migratory birds or bald eagles (FWS 2014a).

Any impacts to protected species if they occur at all would be expected to be short-term and minor.

### **8.11.6.3 Human Uses and Socioeconomics**

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

#### 8.11.6.3.1 Socioeconomics and Environmental Justice

##### ***Affected Resources***

In 2012 the population in Jefferson County was estimated to be over 250,000 which accounted for 1% of the Texas population. Approximately 43% of the population in Jefferson County is white (not Hispanic or Latino), 18% is Hispanic or Latino, 34% is black or African American, and 4% is Asian. Almost 18% of the county population speaks a language other than English at home. Median household income (2007-2011) in Jefferson County and the state is \$42,883 and \$50,920, respectively, with 19% of the county and 17% of the state living below the poverty level (U.S. Census Bureau 2013). Local and out of town visitors frequent Sea Rim State Park.

##### ***Environmental Consequences***

No residential communities are located adjacent to the proposed Sea Rim State Park project. As a result, there would be no potential for short-term impacts from construction of the new facility. Construction materials are generally purchased from the local area. If a local contractor is awarded the bid, this would provide stimulus to local businesses. Any contractor mobilization to the area would provide stimulus to local service industries. Indirect beneficial effects to the local economy may be anticipated as a result of increased recreational and tourism opportunities. These economic benefits would likely be concentrated in the service and retail industry sectors. Sea Rim State Park would also see increases in revenue. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Overall, socioeconomics would not be adversely impacted as a result of the proposed project. The project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with visitation to the Park and tourism.

#### 8.11.6.3.2 Environmental Justice Analysis

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population.

The Trustees find that this project location does not meet the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. Although Jefferson County could be considered to meet the criteria above for a minority population, the project would not result in a high and adverse impact to any of the analyzed resource categories, including environmental and economic categories.

#### 8.11.6.3.3 Cultural Resources

##### ***Affected Resources***

The area of potential effect for reviews under Section 106 of the National Historic Preservation Act includes areas of direct and indirect impact. It is believed that the discovery of and/or the disturbance of intact cultural resources is highly unlikely at any of the proposed construction project locations. The Texas State Historic Preservation Officer provided concurrence on July 3, 2013 to a letter submitted by TPWD's Cultural Resources Program. The letter is summarized below:

TPWD believes that the discovery of, and/or the disturbance of intact cultural resources is highly unlikely at any of the proposed construction project locations. All proposed construction sites are greater than 1 kilometer away from any known archeological sites or high probability areas. Physical inspections at three locations (Fence Lake, comfort station and fish cleaning shelter) have shown that no cultural resources exist. During 1978, the Fence Lake shoreline was intensely searched from above and no new archeological sites were discovered. An additional investigation was conducted at Fence Lake in 2013 and no shell middens or other cultural features were found at that location. A subsurface investigation in the comfort station project area found there is over 4 feet of fill in the area. In the fish cleaning shelter location, a subsurface investigation observed approximately 2 feet of fill. The fourth location (Willow Pond), even though there is little chance of encountering any cultural resources, will be monitored during construction of the boardwalk extension and wildlife viewing platform.

As part of the USACE permit application process for Fence Lake, the USACE interagency coordination notice initiated coordination with local Indian tribes, specifically the Alabama-Coushatta Tribe of Texas. No response was received from any federally recognized Native American Tribes or affiliated groups. Also the USACE staff archaeologist reviewed the project site for cultural resources and found that there are no previously recorded historic properties known to exist within the proposed permit area for Fence Lake. In addition, the proposed work and/or structures are of such limited nature and scope that little likelihood exists for the proposed project to impinge upon a historic property, even if present within the affected area (USACE 2014b).

##### ***Environmental Consequences***

No cultural resources are expected to be impacted by the Sea Rim Park project. Since only an above-ground survey of the Willow Pond worksite was completed, the area would be monitored during construction to ensure that no archaeological sites are disturbed. The Texas State Historic Preservation Office has provided concurrence that discovery of, and/or the disturbance of intact cultural resources is highly unlikely as a result of this project. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

#### 8.11.6.3.4 Land and Marine Management

##### ***Affected Resources***

The Sea Rim State Park project is located within Sea Rim State Park on state-owned lands. The majority of the Park is undeveloped and consists of marsh, beach, dune, and lake habitats. The addition of these

improvements to the Park is in accordance with the Sea Rim State Park master planning process and will meet several objectives of TPWD's Land and Water Resources Conservation and Recreation Plan (2013b). Additionally, Sea Rim State Park operates under the guidance of TPWD's State Park Division Operating Plan (TPWD 2012a). All standards and provisions of these plans and relative regulations would be adhered to, including Texas State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59) and Texas Accessibility Standards issued under the authority of the Texas Government Code, Chapter 469. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

### ***Environmental Consequences***

The Sea Rim State Park project would not change the current land use, zoning, or cause any amendments to management plans that relate to the project area. The area would remain designated for open space recreational use, which allows for developed camping facilities and other structures related to outdoor activities such as boating and fishing. Land use and management authority at the Park would remain under the purview of the TPWD, and development at the Park would comply with the guidance established for coastal recreational land uses and the requirements of the Coastal Zone Management Act. Thus, no impacts would occur to Land and Marine Management under the proposed project.

#### **8.11.6.3.5 Aesthetics and Visual Resources**

### ***Affected Resources***

The general character of the area can be described as a rural park with few developments on site. Most recreational activities on site involve the use of the natural setting. For example, activities such as bird watching and fishing benefit from the natural settings to enhance experiences. Improvements proposed in this project provide enhanced opportunities for recreational experiences while maintaining a small footprint, which is an objective identified during the Sea Rim State Park master planning process. During the construction of the improvements, the materials, and equipment would be staged adjacent to the worksites. The proposed construction is consistent with the surrounding structures and typical of amenities located within Texas coastal state parks.

### ***Environmental Consequences***

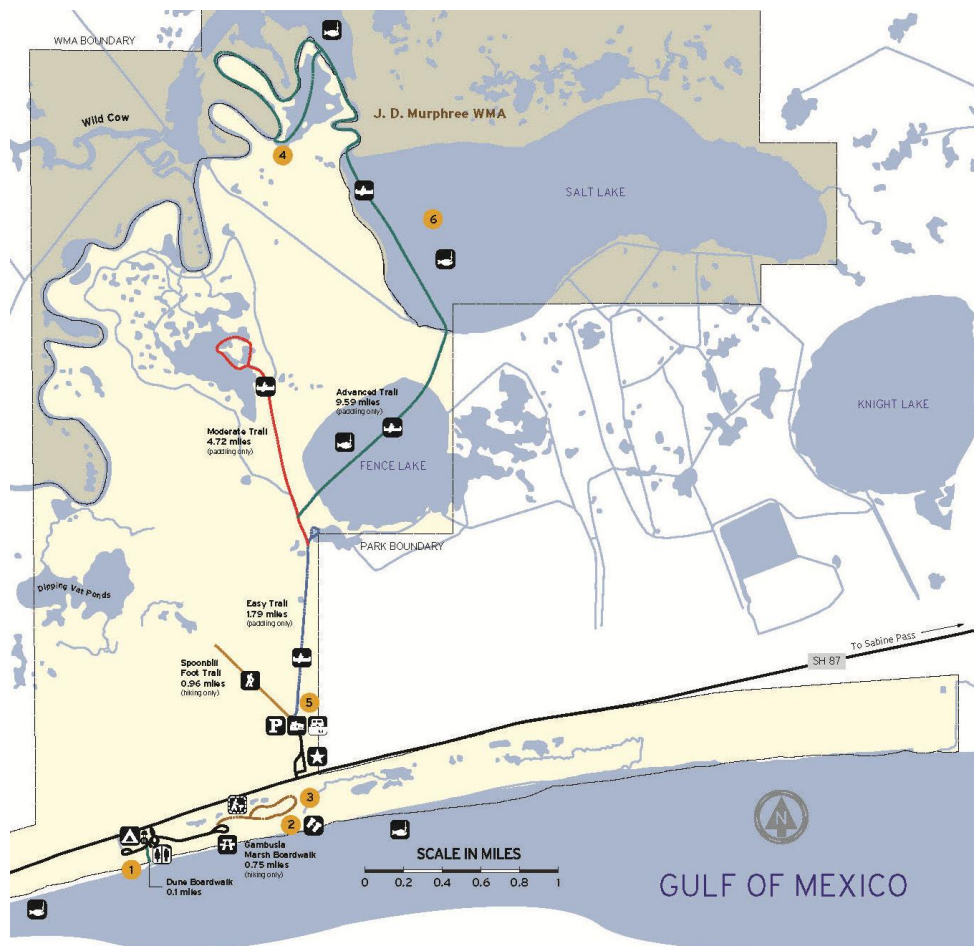
Temporary impacts to visual resources would result from construction of the improvements. Large construction equipment would temporarily reduce the aesthetic values of the project area. The footprint of each improvement is small and construction duration for each improvement is short (less than 30 days). The addition of the structures would change the view shed, but the construction would be consistent with the other amenities located in the Park. The structures would not negatively attract attention, dominate the view, or detract from user activities or experiences. Any adverse impacts to aesthetic and visual resources would be short-term and minor.

#### 8.11.6.3.6 Tourism and Recreational Use

##### ***Affected Resources***

Numerous recreational opportunities are available to local residents and visitors within Sea Rim State Park. Visitors generally come to the Park to access the beach, fish, hunt, use the public boat ramp, and view wildlife. Recreational fishing and hunting activities are managed according to federal, state, and park regulations.

The Park has historically averaged 6,800 to 9,100 visitors per year, but since the Park was severely damaged by Hurricanes Rita and Ike, visitation has dropped significantly due to the lack of facilities. The Park is a stop on the Great Texas Coastal Birding Trail and remains a popular destination for birdwatchers in southeastern Texas despite the lack of facilities. The adjacent wildlife management area and refuges (J.D. Murphee Wildlife Management Area, McFaddin National Wildlife Refuge, and Texas Point National Wildlife Refuge) are popular waterfowl hunting areas. Having these other natural areas in the vicinity of the Park enhances the ecological value for wildlife species by improving habitat connectivity. There are three paddling trails and three foot trails located in the Park (Figure 8-32). The shoreline itself is popular for walking and horseback riding is allowed on the beach. Primitive camping is allowed in designated areas.



**Figure 8-32. Locations of trails within Sea Rim State Park.**



### ***Environmental Consequences***

The addition of the proposed improvements would support the current use of the Park and are expected to increase the visitation and enhance the users' experience. Because the Park is included on the Great Texas Coastal Birding Trail, the viewing platforms would enhance birding opportunities within the Park. The viewing platforms would also enhance other wildlife viewing opportunities within the Park. The fish cleaning station and comfort station would enhance Park resources for both the beach users and anglers. This suite of improvements would complement the ongoing restoration in the Park and is consistent with the goal of balancing biological conservation with recreational opportunities. During the construction period, recreational experience would be impacted from noise and visual disturbances associated with the use of heavy equipment. Access to certain areas could also be restricted or impacted to some degree during construction activities. During construction of the comfort station, it may be necessary to close a portion of the parking lot for staging. However, this would be short in duration and would not have significant impacts to public access or use of the boat ramp. The construction of the Fence Lake and Willow pond viewing platforms would not alter existing public access points. The construction of the fish cleaning station may interrupt the use of the parking area and rinse station adjacent to the construction area, but this would be temporary. The fish cleaning shelter would replace the temporary rinse shower. While these temporary inconveniences would result in minor short-term impacts on tourism and recreational use during the construction, over the long term, improved access and enhanced facilities are anticipated to benefit tourism and recreational use. Overall, implementation of the Sea Rim State Park project would contribute positively to visitor experience and public access. Any adverse impacts to tourism and recreational use would be short-term and minor.

#### **8.11.6.3.7 Infrastructure**

### ***Affected Resources***

No additional infrastructure would be needed to implement the project. The viewing platforms and comfort station would not need any utilities. Water for the fish cleaning station is currently onsite. Road access and parking for all improvements are currently present.

Highway 87 is not a major thoroughfare and use is limited to local Park and Wildlife Refuge/Area traffic. West of the Park Highway 87 runs into and ends in the McFaddin National Wildlife Refuge. Heading east Highway 87 connects to the Texas Point National Wildlife Refuge, J.D. Murphee Wildlife Management Area and then to Port Arthur, Texas.

### ***Environmental Consequences***

The Sea Rim State Park project would not impact any existing public infrastructure or road, but it may temporarily impact Park facilities during the alteration of water and staging of materials. During the construction activities, there would be short-term localized disruptions of parking and facilities within the Park. No additional utilities would be needed to implement and/or maintain the project. Construction activities should not alter the operational capacities of the Park. The addition of the fish cleaning shelter and comfort station would provide a long-term benefit to recreational users. Any adverse impacts would be short-term and minor.



#### 8.11.6.3.8 Public Health and Safety and Shoreline Protection

##### ***Affected Resources***

The Sea Rim State Park project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All waste generated during construction of the improvements would be disposed in the appropriate waste or recycle collection receptacles in the Park. All occupational and safety regulations and laws would be followed to ensure safety of all workers and the public. The addition of the comfort station would help improve environmental health within the Park. Shoreline protection and stabilization efforts are managed by the State.

##### ***Environmental Consequences***

No hazardous waste would be created during construction of the improvements. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. Soil and sediment stabilization measures would be incorporated into the Sea Rim State Park project design as needed in areas where the potential exists for erosion to occur in order to protect resources and ensure public health and safety. No adverse effects to public health and safety and shoreline protection are expected as a result of this project.

#### 8.11.7 Summary and Next Steps

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Sea Rim State Park project would build two viewing platforms, a comfort station (vault toilet), and a fish cleaning shelter in the Sea Rim State Park. The project is considered to fall under Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

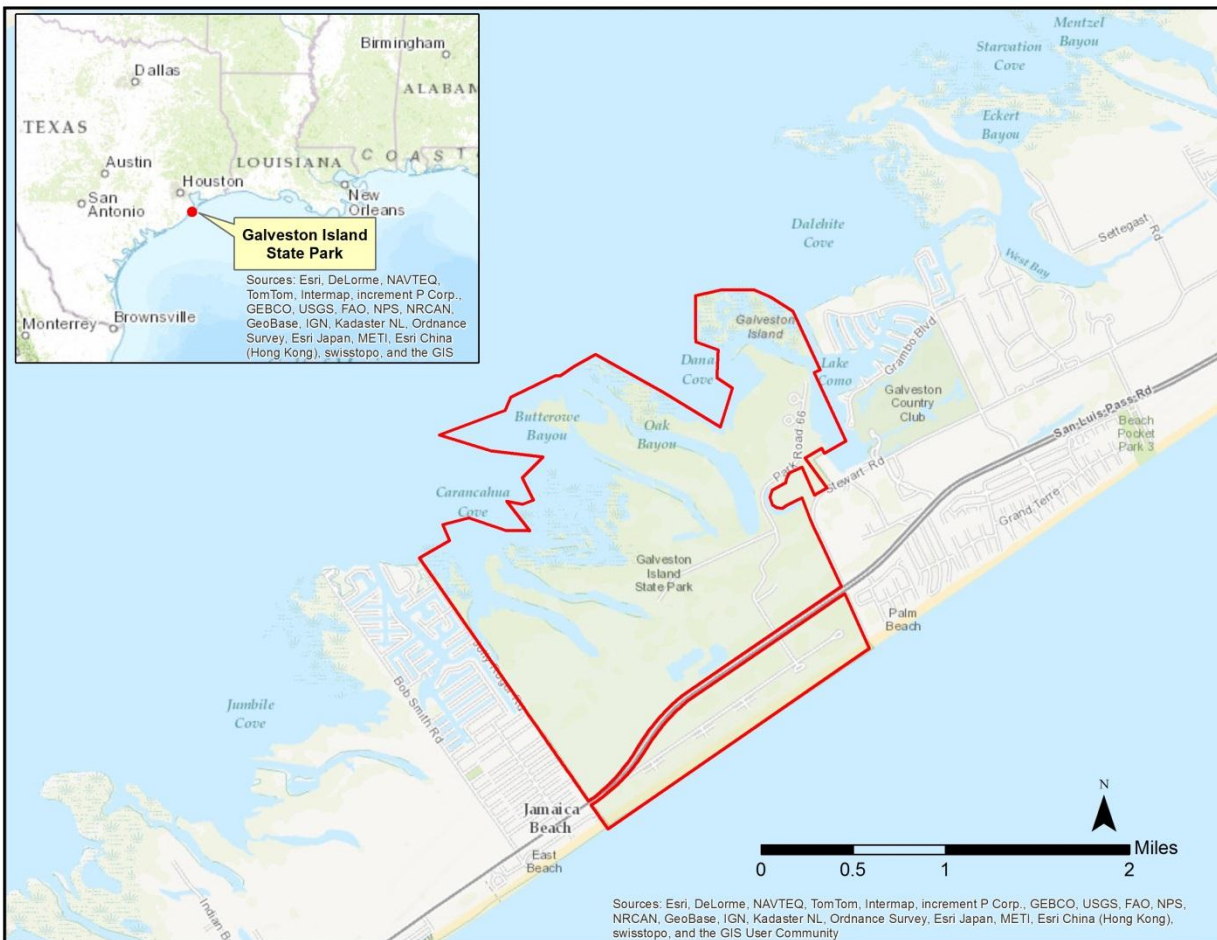
The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories and no moderate to major adverse impacts are anticipated to result. This restoration project would enhance visitor use and enjoyment of Park resources. The Trustees have started coordination and reviews under the National Historic Preservation Act, Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and other federal statutes, where appropriate. The Trustees have completed consultations and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald

and Golden Eagle Protection Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.

## 8.12 Galveston Island State Park Beach Redevelopment: Project Description

### 8.12.1 Project Summary

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, southwest of the City of Galveston in Galveston County, Texas (Figure 8-33). The proposed Galveston Island State Park Beach Redevelopment project includes the building of multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of the Park. These improvements would enhance visitor use and enjoyment of Park resources. The estimated cost for this project is \$10,745,060.



**Figure 8-33. Location of Galveston Island State Park.**

### 8.12.2 Background and Project Description

The proposed Galveston Island State Park project will restore infrastructure for recreational facilities to enhance recreational access and opportunities on the Texas coast. Galveston Island State Park is located on the west end of Galveston Island, south of Houston, Texas, along the upper Texas coast. The Park features 2,000 acres of upper Gulf Coast barrier island ecosystem. The Park contains an array of coastal habitats that host a surprising variety of wildlife and is visited by birds from throughout the eastern hemisphere during the spring and fall migration seasons. Wading and shore birds, mottled and

mallard ducks, raccoons, armadillos and marsh rabbits are found in the park, which is ideal for wildlife observation and photography. Bay and surf fishing for spotted seatrout, sandtrout, redfish, black drum, croaker and flounder is also popular.

Historically, the Park provided camping facilities and associated amenities that were accessible to day- and overnight-visitors. However, in 2008 Hurricane Ike caused severe devastation and destroyed much of the Park's infrastructure (Figure 8-34). To guide the restoration process, TPWD developed the Galveston Island State Park Master Plan in 2011 to identify appropriate restoration efforts for the Park (TPWD 2011). Developments proposed by this project are consistent with the Master Plan and will help improve and enhance recreational opportunities along the Texas coast. Specifically, the proposed Galveston Island State Park project includes the building of multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of the Park.

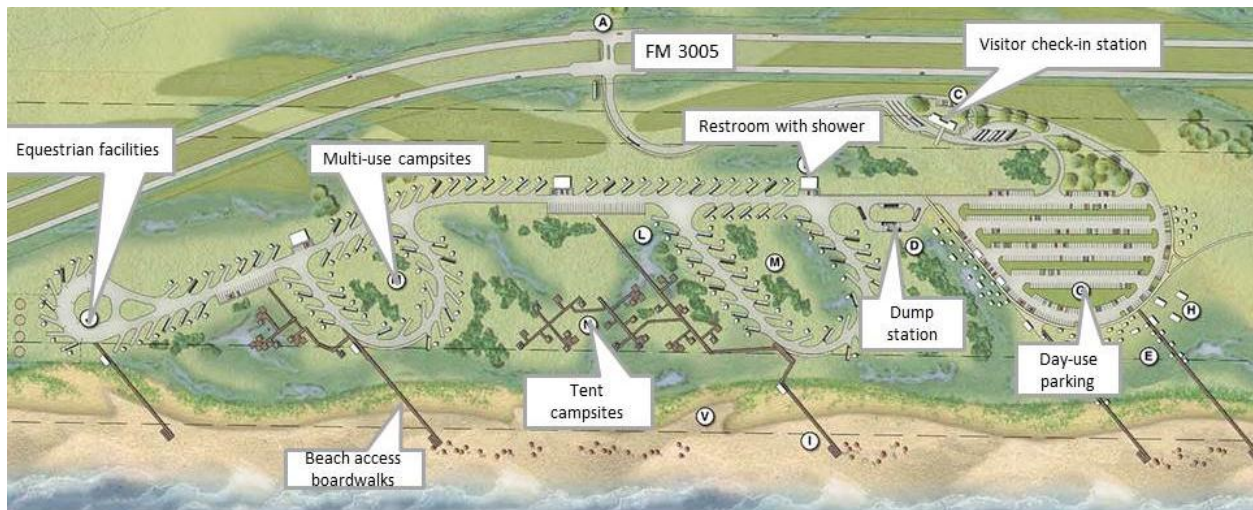


**Figure 8-34. Destruction caused by Hurricane Ike at Galveston Island State Park.**

The Galveston Island State Park project will provide greater access to visitors and enhance their recreational experiences. At the campsite facilities (Figure 8-35), comfort stations with associated parking spots are paired with rinse showers. The beach access boardwalks will provide access to the beach from multi-use campsites and tent campsite areas across the dunes (Figure 8-35). The multi-use campsites are currently designed to be RV accessible and equipped with water and electric hook-ups. Each site would also have a picnic shelter and grill within close proximity. Native trees and shrubs will be planted to provide a screen between the campsites. The location of the campsites has been designed to account for future dune migration. An RV septic dump station is planned for the Park. Additionally, this project proposes to build multiple tent campsites with associated amenities, which may include



boardwalks and parking spaces. The equestrian facilities will include limited trailer parking and access to horse corral pens as well as the beach.



**Figure 8-35. Artist rendering of Galveston Island State Park beach development highlighting camping loops, tent platforms and beach access boardwalks. The artist rendering is developed by studioOutside; however it has been modified for this figure.**

#### 8.12.3 Evaluation Criteria

This proposed Galveston Island State Park project meets the evaluation criteria established by OPA and the Framework Agreement. Texas experienced a loss of recreational use along the Texas coast during the Spill, including recreational fishing, beach use, camping, diving, and wildlife viewing. The project would enhance opportunities for public use and enjoyment of natural resources, helping to offset a portion of the adverse impacts to such uses caused by the Spill. Creating the proposed infrastructure will provide facilities for over-night and day-use visitors as well as access and facilities for equestrian use. Thus, the nexus to resources injured by the Spill is clear (See 15 C.F.R. § 990.54(a)(2) and Sections 6a-6c of the Framework Agreement).

The project is technically feasible and utilizes proven techniques with established methods and documented results and can be implemented with minimal delay. Government agencies have successfully implemented similar projects in the region. For these reasons, the project has a high likelihood of success (See 15 C.F.R. § 990.54(a)(3) and Section 6e of the Framework Agreement).

A thorough environmental review, including review under applicable environmental regulations, is described in Section 8.12. It indicates that adverse effects from the project would largely be minor, localized, and often of short duration. In addition, the BMPs and measures to avoid or minimize impacts described in Section 8.12 would be implemented. As a result, collateral injury would be avoided and minimized during project implementation (construction, installation, operations, and maintenance) (15 C.F.R. § 990.54(a)(4)).

Cost estimates are based on similar past projects, and demonstrate that the project can be conducted at a reasonable cost (See 15 C.F.R. § 990.54(a)(1)). Developments proposed by this project are consistent with the Park Master Plan and will help improve and enhance recreational opportunities along the Texas

coast. As a result, the proposed project is considered feasible and cost effective (See 15 C.F.R. § 990.54(a)(1) and (3)).

Public comments were acquired prior to the development of the Galveston Island State Park Master Plan through stakeholder meetings/workshops, public meetings, and surveys. The planning team designed a multi-faceted public engagement strategy that canvassed a local, state, and national audience. Emphasis was placed on reaching out to not only past visitors, but to connect with those audiences that have never been served by Galveston Island State Park or even the state park system in general. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Galveston Island State Park.

Recreational use projects in general and this specific project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

#### **8.12.4 Performance Criteria, Monitoring and Maintenance**

This project includes monitoring efforts to ensure project designs are correctly implemented during construction. Monitoring has been designed around the project objective, which is to construct multi-use campsites, tent campsites, dune access boardwalks, equestrian facilities, as well as restroom and shower facilities on the beach side of Galveston Island State Park to enhance recreational use of the Park.

Performance criteria for this project will include a determination of successful construction of the project according to design to ensure that the opportunity for recreational use of the Park will be enhanced. Monitoring efforts will also be implemented to ensure that the project is constructed in accordance with construction documents and the Master Plan for the Park. The State Park currently has visitation monitoring procedures to capture the number of daytime visitors, overnight visitors, and participants in interpretive programs. This information will be collected and shared annually to document performance monitoring of the project for 5 years after construction completion.

Ongoing maintenance of the constructed facilities would be the responsibility of Galveston Island State Park, which is owned and managed by the TPWD.

#### **8.12.5 Offsets**

The Early Restoration benefits provided by the project, also known as NRD Offsets, are \$21,490,120 expressed in present value 2013 dollars to be applied against the monetized value of lost recreational use provided by natural resources injured in Texas, which will be determined by the Trustees' assessment of lost recreational use for the Spill.<sup>45</sup> This Offset is based on the use of a BCR ratio of 2.0, reflecting the value that users are expected to be provided by the implementation of the proposed

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<sup>45</sup> For the purposes of applying the NRD Offsets to the calculation of injury after the Trustees' assessment of lost recreational use for the Spill, the Trustees and BP agree as follows:

- The Trustees agree to restate the NRD Offsets in the present value year used in the Trustees' assessment of lost recreational use for the Spill.
- The discount rate and method used to restate the present value of the NRD Offsets will be the same as that used to express the present value of the damages.

project relative to its cost. Please see Chapter 7 of this document (Section 7.2.2) for a description of the methodology used to develop monetized Offsets.

#### 8.12.6 **Cost**

The total estimated cost to implement this project is \$10,745,060. This cost reflects estimates developed from the most current information available to the Trustees at the time of the Galveston Island State Park project negotiation. The cost includes provisions for planning, engineering and design, construction, monitoring, and potential contingencies.



## **8.13 Galveston Island State Park Beach Redevelopment: Environmental Review**

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, which is located on the upper Texas coast, near Houston, Texas. The park is located southwest of the City of Galveston in Galveston County, Texas (Figure 8-33). The proposed Galveston Island State Park Beach Redevelopment project (Galveston Island State Park project) includes the building of multi-use campsites, tent campsites, beach access boardwalks, equestrian facilities, visitor check-in station, and restroom and shower facilities on the beach side of the Park. At the campsite facilities, comfort stations with associated parking spots are paired with rinse showers. The proposed beach access boardwalks would provide access to the beach from multi-use campsites and tent campsite areas across the dunes. The multi-use campsites are currently designed to be RV accessible and equipped with water and electric hook-ups and a dump station. Each site would also have a picnic shelter and grill within close proximity. This redevelopment would enhance visitor use and enjoyment of Park resources. The estimated cost for this project is \$10,745,060.

### **8.13.1 Introduction and Background**

The proposed Galveston Island State Park project would restore infrastructure for recreational facilities to enhance recreational access and opportunities on the Texas coast. In 2008 Hurricane Ike caused severe devastation and destroyed much of the Park's infrastructure (Figure 8-34). The Park lost approximately 80 feet of beach and two-thirds of its camping facilities. Utilities and structures were destroyed, and the entire Park was inundated with salt water. After Hurricane Ike, the TPWD worked with the Texas Department of Transportation to remove debris. Prior to the debris cleanup, TPWD consulted with the Texas Historical Commission under Section 106 of the National Historic Preservation Act, and the Texas Historical Commission concurred with the cleanup plan. Large heavy equipment was used to bulldoze, scrape, and level the beach, pushing all asphalt, concrete, posts, and other park structures into debris piles. Large items of debris were removed from the piles and the remaining sand was returned to the beach. New plumbing, lift stations, electric and water hookups were installed. Park recovery efforts were focused within the footprint of pre-existing facilities. Part of the recovery efforts also included replanting areas near the camping loop.

To guide the restoration process, TPWD developed the Galveston Island State Park Master Plan in 2011 to identify appropriate restoration efforts for the Park (TPWD 2011). Park amenities proposed by this project are consistent with the Master Plan and would help improve and enhance recreational opportunities along the Texas coast. Specifically, the proposed Galveston Island State Park project includes the building of multi-use campsites, tent campsites, visitor check-in station, beach access boardwalks, equestrian facilities, and restroom and shower facilities on the Gulf side of the Park (Figure 8-35). In efforts to restore the presence of recreational resources within the Park and retain them for future generations, a dune field buffer would be preserved, which extends 250 feet from the current beginning of the dune line at the beach. This area would be specifically reserved for dune field and wetland swale restoration, and allow for the natural migration of these systems. No development outside of beach access boardwalks would be permitted in this buffer area. In addition to the creation of this dune field buffer, the Master Plan aggregated recreation amenities such as multi-use campsites and day-use facilities into the smallest development footprint attainable. This would allow for a greater area of undisturbed and restored natural area located on the eastern edge of the property.

The Galveston Island State Park project would provide greater access to visitors and enhance their recreational experiences. Prior to Hurricane Ike, there were 150 multi-use campsites, no campsites designated for tents only, and no horse corrals. Currently only 33 camping facilities continue to function at the GISP beachside following the destruction by Hurricane Ike. These camping facilities are insufficient to meet public demand. Post-Ike public input has consistently shown an interest in greater capacity. This project would replace the existing campsites and bring the total number of campsites closer to pre-Ike capacity with about 10 tent campsites and over 100 multi-use campsites. Currently, the beach-side day use area has parking for approximately 205 cars. The proposed project would result in a total of about 520 parking spaces (exact numbers to be determined after construction documents have been completed).<sup>46</sup>

Public comments were acquired prior to the development of the Galveston Island State Park Master Plan through stakeholder meetings/workshops, public meetings, and surveys. The planning team designed a multi-faceted public engagement strategy that canvassed a local, state, and national audience. Emphasis was placed on reaching out to not only past visitors, but also those audiences that have never been served by Galveston Island State Park or the state park system in general. All comments received were reviewed and evaluated by the planning team in the context of the redevelopment plans at Galveston Island State Park. Recreational use projects in general and this specific project were submitted as restoration projects on the NOAA website (<http://www.gulfspillrestoration.noaa.gov>).

All federal, state, and local required permits would be secured prior to project implementation. Compliance with state requirements, including the Texas Coastal Management Program, and compliance with federal requirements including, but not limited to, the Endangered Species Act, Clean Water Act, National Historic Preservation Act, and the Coastal Zone Management Act would be fulfilled prior to implementation. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014). In addition,

TPWD obtained a permit (SWG-2012-00631) from the USACE for the Galveston Island State Park beach development project under Section 404 of the Clean Water Act in December 2013. The permit includes all of the redevelopment improvements proposed for the Gulf beachside of Galveston Island State Park.

<sup>47</sup> The redevelopment of the beachside day-use and overnight camping facilities in Galveston Island State Park would include multi-use campsites, a visitor check-in station, picnic shelters, restrooms, dump stations, parking, connecting drives, and beach access boardwalks. A preliminary jurisdictional wetland

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<sup>46</sup> While the permit specifies the number of each improvement (campsites, boardwalks, etc.) that is planned and approved by the USACE, DWH Early Restoration funds will only fund a portion of the total number.

<sup>47</sup> While the permit specifies the number of each improvement (campsites, boardwalks, etc.) that is planned and approved by the USACE, DWH Early Restoration funds will only fund a portion of the total number.

determination was completed and accepted by the USACE (SWG-2012-00631) on October 30, 2012 and will remain valid for 5 years (until 2017). The permit also approved the mitigation plan to address 2.67 acres of permanent impacts and 0.41-acres of secondary impacts to wetlands due to construction (TPWD 2013a). The mitigation plan for these impacts would create, restore, and enhance over 12 acres of wetlands. This wetland mitigation would not be funded through DWH Early Restoration. Additional portions of the permit **not** paid for by DWH Early Restoration funds include:

- Access road and day use parking
- Tent parking areas
- RV Dump Station
- Camp Loop Roads and Spurs

In September 2012, TCEQ stated that Section 401 water quality certification for this individual Section 404 permit application could be assumed if the work meets conditions of the TCEQ best management checklist (TPWD 2013a, Section 3). The checklist includes BMPs for erosion control, post construction total suspended solids control, and sedimentation control, which are summarized below.

Disturbed areas must be stabilized to prevent the introduction of sediment to adjacent wetlands or water bodies during wet weather conditions (erosion). Mulch filter berms and socks will be maintained and remain in place until the area has been stabilized. After construction has been completed and the site is stabilized, total suspended solids loadings shall be controlled through the use of vegetative filter strips. Dredged material shall be placed in such a manner that prevents sediment runoff into water in the state, including wetlands. Prior to project initiation, the project area must be isolated from adjacent wetlands and water bodies by the use of BMPs to confine sediment. Compost filter berms and socks as well as mulch filter berms and socks will be maintained and remain in place until project completion.

All facilities and boardwalks would comply with Texas Accessibility Standards and Americans with Disabilities Act Guidelines as well as federal, state, and local law concerning construction standards and building codes to protect public health, safety, and welfare. The project would also comply with the standards in the TGLO's Dune Protection and Improvement Manual for the Texas Gulf Coast (TGLO 2005).

Galveston Island State Park is operated by the TPWD whose mission includes protecting, enhancing and increasing recreational opportunities throughout the state. The Galveston Island State Park project meets TPWD's objectives by increasing access to and participation in the outdoor recreational opportunities. The agency's mission and objectives are described in detail in TPWD's Land and Water Resources Conservation and Recreation Plan (2013b). In addition, Galveston Island State Park would follow guidance described in the State Parks Division Operating Plan (TPWD 2012a).

The TPWD regulations at Title 31, Texas Administrative Code (TAC) Chapter 59 govern the health, safety and protection of persons and property in state parks, historic sites, scientific areas, or forts, including encompassed waters, under the control of the TPWD. Implementation of the proposed project would follow the TPWD regulations, including the State Park Operational Rules at 31 TAC Chapter 59, Subpart F (Sections 59.131 to 59.136). The TPWD State Park Division also follows Division procedures established in 2010 and revised in 2012 for exotic, feral, and nuisance animal control.

The environmental review, including cumulative impacts, considered all improvements that are part of this project including those not paid for by the DWH Early Restoration Funds unless otherwise stated.

#### **8.13.2 No Action**

Both OPA and NEPA require consideration of the No Action alternative. For this Draft Phase III ERP proposed project, the No Action alternative assumes that the Trustees would not pursue the Galveston Island State Park project as part of Phase III Early Restoration.

Under No Action, the existing conditions described for the project site in the affected environment subsections would prevail. Restoration benefits associated with this project would not be achieved at this time.

#### **8.13.3 Project Location**

Galveston Island State Park is a 2,000-acre park in the middle of Galveston Island, southwest of the City of Galveston and northeast of and adjacent to the community of Jamaica Beach in Galveston County, Texas (Figure 8-33). Galveston Island is part of a series of barrier islands and bay-lagoon systems that separate much of the Texas coastal mainland from the Gulf of Mexico. Most undeveloped parts of the island are characterized by coastal prairies and marshlands with some areas containing coastal dunes. Because barrier islands serve as transition zones between land and ocean, they support a variety of distinct eco-regions, including beaches, prairies and wetlands. Each supports a diverse array of life. The barrier island also protects the mainland from storms, while the lagoons, bay and salt marshes serve crucial functions in the life cycles of many fish, birds, and other wildlife.

The proposed Galveston Island State Park project is located entirely within Galveston Island State Park, which is bound by 13 Mile Road to the east, Jolly Roger Road to the west, Gulf of Mexico to the south, and West Bay to the north. Residential and commercial properties occur on both sides of Galveston Island State Park with the Village of Jamaica Beach serving as a primary residential area to the west of the site. Within the Park, the proposed campground area is bordered to the northwest by Farm to Market (FM) 3005 (Figure 8-36).

#### **8.13.4 Construction and Installation**

Construction activities are described in detail in the Individual Permit Application (SWG-2012-00631, TPWD 2013a), which was approved by the USACE in December 2013. The current design plans for the Galveston Island State Park project place the beach redevelopment back from the Gulf beachfront to account for future beach migration. The height at which the beach access boardwalks are built would also take dune migration and growth into account. This project is in the design phase and adjustments would be made as the construction documents are finalized.

Construction on the beach redevelopment being funded outside of DWH Early Restorations has already begun. Portions of the proposed redevelopment would occur in an area where existing campgrounds are being used. Overnight beach camping would be suspended during construction of the new campsite facilities. The improvement details below include portions of the plan approved by the permit that will not be paid for by the DWH Early Restoration Funds. The permit specifies the number of each improvement (campsites, boardwalks, etc.) that is planned and approved by the USACE; however, the exact number to be funded by DWH Early Restoration Funds may be modified as building designs are finalized.



**Figure 8-36. Location of proposed developments within Galveston Island State Park. The red line outlines the entire 37 acres of the construction footprint.**

#### 8.13.4.1 Visitor Check-in Station

The check-in process, and resulting queuing, would be minimized by the addition of three vehicle lanes. Temporary short-term parking for cars and recreational vehicles would also provide for a better traffic flow into the Park.

#### 8.13.4.2 Day-Use Facilities

The beach-side day-use area currently has parking for approximately 205 cars. It is estimated that approximately 520 day-use parking spaces would be created. However, the exact number of parking spaces would be determined after construction documents have been generated. Day-use parking and facilities would reside directly southeast of the Park check-in station, and would be organized into a loop drive that surrounds an open field designated for events. Restrooms would be provided in this area to support beach day-use activities. A pedestrian trail would surround the parking loop and transition into beach access boardwalks that would crossover the preserved dune fields to the beach beyond.



#### 8.13.4.3 Multi-Use Campsites

A series of multi-use campsites<sup>48</sup> would be located between the highway and dune field buffer to facilitate overnight lodging in close proximity to the beach (Figure 8-37). The multi-use campsites would incorporate a series of loop drives that orient views toward the dunes and beach, while positioning the facility for future dune field migration. In order to maximize primary capacity within the multi-use area, campsites would be offset from one another approximately 50 feet on center, with loops approximately 220 feet apart. The natural areas created between loops would be reserved for native grasses and swales to incorporate storm water collection. There would be comfort stations located for multi-use and tent campsites with limited parking at each location. Each multi-use campsite would be equipped with electric and water hook-ups and have a picnic shelter and grill located nearby. A dump station would be located to serve the entire site. Beach access boardwalks would be located at the southern end of each loop and crossover the dune field to the beach. Parking and trail connections to tent campsites would converge at the connection of loop road to the beach access boardwalk.



Figure 8-37. Example of multi-use campsites.

#### 8.13.4.4 Beach Access Boardwalks

Beach access boardwalks would provide access to the beach from the multi-use campsites, equestrian facilities, and day-use facilities area (**Error! Reference source not found.**). These boardwalks would span the dune field buffer. The primary purpose of building the boardwalks would be to facilitate access from parking areas to the beach while protecting the dunes and surrounding habitat. The boardwalks would be angled to deter wind erosion of dunes.

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<sup>48</sup> The permit is for the entire Galveston Island State Park Beach Redevelopment Plan, which specifies 112 multi-use campsites. Phase III Early Restoration Funds will only pay for a portion of the entire Plan.



**Figure 8-38. Example of proposed boardwalks.**

Current designs plan for five beach access boardwalks and boardwalks to access the tent platforms for a total of approximately 2,700 linear feet of elevated boardwalk<sup>49</sup>. Boardwalks would be about 10 feet wide and constructed with wood. There would be 12-inch x 12-inch wooden piles, approximately 24 feet long, driven into the ground approximately 8 feet on center. The total boardwalk footprint is anticipated to be approximately 21,600 square feet.

Boardwalks are generally constructed so that there is no removal of vegetation and there are no cuts in the dunes. All facilities and boardwalks would comply with Texas Accessibility Standards and Americans with Disabilities Act guidelines, they would meet the standards in TGLO's Dune Protection and Improvement Manual for the Texas Gulf Coast (TGLO 2005) as well as federal, state, and local laws concerning construction standards and building codes to protect public health, safety, and welfare.

#### **8.13.4.5 Tent Campsites**

Tent campsites<sup>50</sup> would be located between the multi-use campsite loops behind the dune field buffer. Campers would access these sites from small parking bays that would be located at the intersection of multi-use loop drives and beach access boardwalks. Tent campsites would provide elevated tent platforms for overnight camping along the beach (Figure 8-39). The current design anticipates the tent platforms to be 20 feet by 20 feet. However, construction documents have not been developed and these dimensions are preliminary.

#### **8.13.4.6 Picnic Shelters**

Similar to the tent campsites, picnic shelters would provide platforms slightly elevated above the ground. The shelters would be covered with a roof and open to admit breezes from all directions. Picnic shelters adjacent to multi-use campsites may contain a grill.

<sup>49</sup> The permit is for the entire Galveston Island State Park Beach Redevelopment Plan, which specifies about 2,700 linear feet of boardwalk. Phase III Early Restoration Funds will only pay for a portion of the entire Plan.

<sup>50</sup> The permit is for the entire Galveston Island State Park Beach Redevelopment Plan, which specifies 35 tent campsites. Phase III Early Restoration Funds will only pay for a portion of the entire Plan.





**Figure 8-39. Artist's vision of a possible design for tent camping platforms at Galveston Island State Park. Graphic created by Richard Garcia, TPWD Infrastructure Division, Planning and Design Branch.**

#### 8.13.4.7 Equestrian Facilities

Currently there are no equestrian facilities located in the Park although horses can access the beach from adjacent city-owned areas on either end of the Park. Horses are allowed on the beach from November 1 through February 28. The equestrian facilities would include eight overnight equestrian trailer parking spaces and access to four horse corral pens. A small equestrian trail head would be located at the end of the multi-use campsites that links to the beach for seasonal (winter) use. The trail would be fenced and signed designating its use.

#### 8.13.4.8 Utilities

Proposed utilities would be replacing those lost from Hurricane Ike. New utilities would be installed below ground would include water, sanitary sewer, and electrical. All new utilities lines are encompassed within the 37-acre construction footprint. The new utility lines would be connected to existing service lines at the edge of the construction footprint. The location of the wastewater lines, water lines, electric lines and their connection points as well as dump station as currently designed can be seen in in the Galveston Island State Park Individual Permit Application (TPWD 2013a). No capacity upgrade to the utility connections (including water services) would be needed. Engineering designs for this project have not been fully developed. However, all new utility lines would be installed in accordance with federal, state, and local laws concerning construction standards and building codes to protect public health, safety, and welfare.

Electrical demands would exceed what is currently being used but are not expected to exceed the capabilities of existing feeder lines. Center Point Energy supplies electricity to the site and anticipates the capacity required for the redevelopment. Current elevated electrical lines running through the

proposed Park construction areas would be relocated to the main highway by the power company (Center Point Energy) at their expense.

Park sewer lines are connected to City of Galveston via pressure lines. A dump station is planned to be included on the northeast side of the development as part of the campground improvements. However, it will be paid for by a separate funding source.

Storm water would be directed to constructed wetlands and/or ditches. It is anticipated that storm water impacts would be similar to or less than the impacts before the Hurricane.

#### **8.13.4.9 Lighting**

Standards for new construction implemented by TPWD include the use downward facing lights. Other lights would be directed away from the beach. Park construction work would be conducted during daylight hours so additional lighting should not be necessary.

#### **8.13.4.10 Grading and Ground Disturbance**

Over 200 structures including concrete picnic shelters, restrooms and the visitor center were previously demolished after Hurricane Ike as specified in the permit application (TPWD 2013a). Remaining pavement and buried utility lines within the demolition zone were excavated and removed. The proposed redevelopment, including new utilities, would require grading within the project area which has a construction footprint of 37 acres. It has been anticipated that there would be approximately 15.61 acres of impervious surface cover from this project. The footprint of impervious cover includes the roads, parking areas, day-use area, multi-use campsites, tent campsites, visitor check-in station, picnic shelters, restrooms, a dump station, and beach access boardwalks. The size of impervious area in the Park redevelopment is 2.7 acres less than the original pre-Ike development (Figure 8-40). This is a conservative approximation. Items such as the boardwalks and campsites may have surfaces which allow water to pass through. For additional details and maps, see the Galveston Island State Park Individual Permit Application (TPWD 2013a).

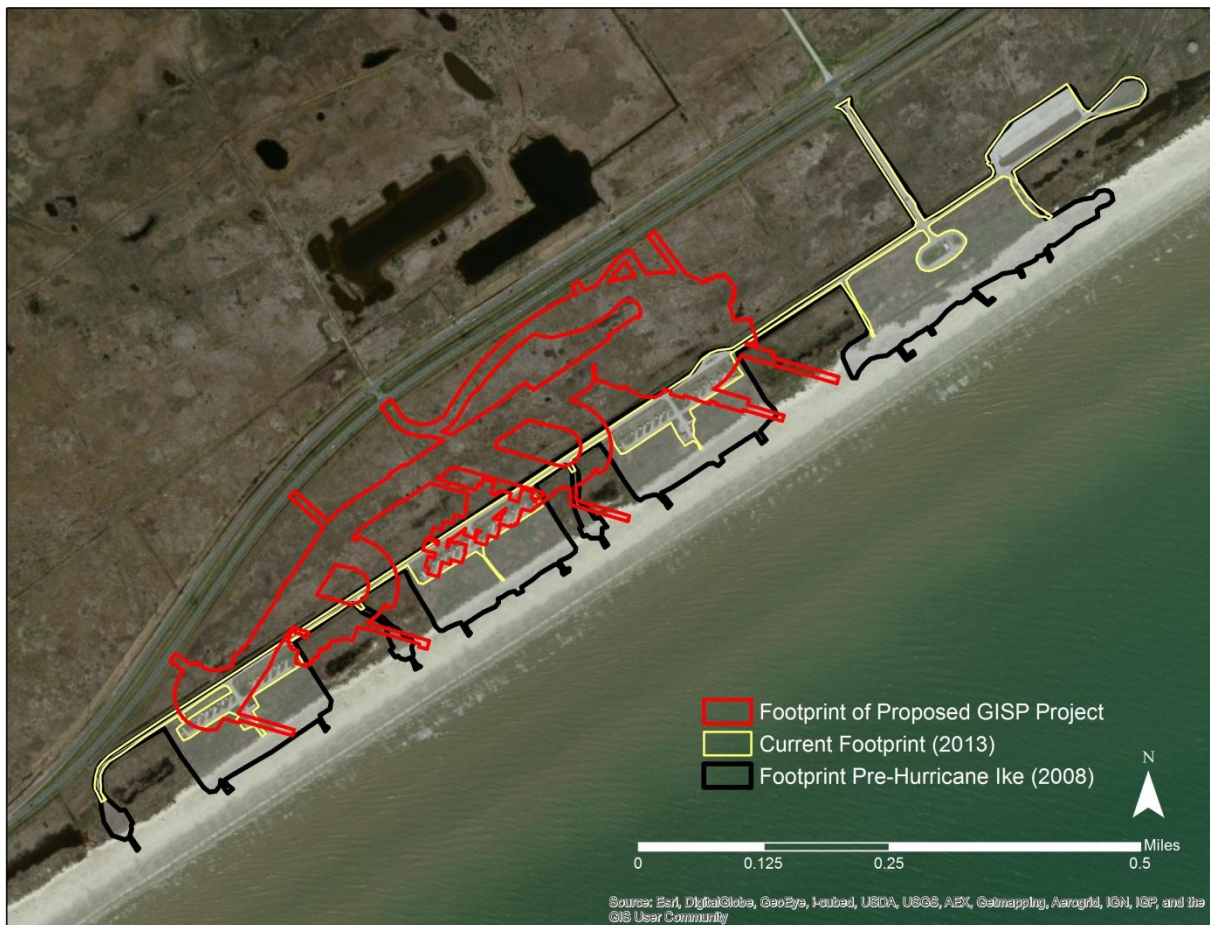
#### **8.13.4.11 Mobilization, Staging, and Stockpiling**

Temporary staging areas for material, supplies, and equipment during construction would be located within disturbed areas of the former campground and adjacent parking lots on Park property. Heavy equipment such as large excavators, dump trucks, bulldozers, graders, pavers, concrete trucks, and semi-trailers may be used during construction. Equipment usage would be determined by the contractor.

Construction waste would be removed by the contractor to an appropriate landfill of their choice using dump trucks and roll-off dumpsters or as specified by TPWD Infrastructure.

#### **8.13.4.12 Construction Schedule**

Although a construction schedule has not yet been finalized, construction is anticipated to take approximately 19 months to complete unless severe weather delays construction. Work hours, in general, would be during daylight hours for 5-6 days per week. The construction schedule would be managed so as to avoid impacts to protected species. Construction of beach access boardwalks would only occur from October 2 to March 31 to avoid sea turtle nesting season.



**Figure 8-40. Location of proposed Galveston Island State Park Project footprint in comparison to the footprint of the Park facilities present pre-Hurricane Ike (2008).**

#### 8.13.5 Operations and Maintenance

Galveston Island State Park is open 7 days a week year-round. Recreational activities at this park include camping, wildlife observation, birding, beach combing, walking nature trails, kayaking, fishing, and beach swimming. Ongoing maintenance of the constructed facilities would be the responsibility of Galveston Island State Park, which is owned and managed by the TPWD. During construction, there would be monitoring efforts to ensure that wildlife and habitat is protected and that Galveston Island State Park project designs are correctly implemented. (For specific monitoring efforts, see Section 3.2 Biological Environment.) Staffing levels at the Park prior to Hurricane Ike included 16 full-time personnel and 5 seasonal positions. In comparison, current staff levels are 10 full-time personnel and four seasonal positions. It is anticipated that staffing levels would return to pre-Ike levels after completion of the Galveston Island State Park project. The only new maintenance activity required would be possible periodic cleaning of the new horse corrals when facility users did not adequately complete this task themselves. Maintenance and other activities at the Park follow all guidance provided by the TPWD State Park Division Operating Plan (TPWD 2012a).



#### 8.13.6 Affected Environment and Environmental Consequences

The USACE Individual Permit Application (SWG-2012-00631) included background information about the project, preliminary design plans and an assessment of impacts to wetlands (Section 1), a preliminary jurisdictional determination approval letter (Section 2), the Texas Commission on Environmental Quality (TCEQ) Tier I Water Quality Checklist Certification (Section 3)<sup>51</sup>, a coastal zone consistency determination application (Section 4), a cultural resources report (Section 5), a threatened, endangered, and rare species habitat assessment (Section 6), an alternatives analysis (Section 7), and a wetland mitigation plan (Section 8) (TPWD 2013a). All of the alternatives related to the design and configuration of the new facilities attempted to minimize impacts to the surrounding environment and reduce external effects resulting from weather events. The preferred alternative, which is consistent with the redevelopment project proposed here, would rebuild camping facilities with access to the beach; protect facilities from weather, beach erosion, and subsidence; provide sufficient facilities to meet public demand; rebuild facilities with safe direct access to the beach; preserve the contiguous natural beach environment and habitat; and minimize wetland impacts by limiting the development footprint. The Individual Permit Application and its analysis are therefore incorporated by reference (per CEQ's NEPA regulations at 40 C.F.R. §1502.21) as applicable. This summation is not fully inclusive of the extensive information found in the Individual Permit Application. Readers should reference the Individual Permit Application for complete information.

The permit (SWG-2012-00631) for the Galveston Island State Park Beach Redevelopment project was approved by the USACE in December 2013. The USACE prepared an Environmental Assessment and Statement of Findings (EA and SOF) in response to TPWD's application for the Galveston Island State Park beach redevelopment permit. The EA and SOF did not identify any significant environmental effects resulting from the proposed work. The USACE evaluated the impact of this proposed activity on aspects affecting the quality of the human environment and determined that this action does not require an Environmental Impact Statement (USACE 2013).

The Trustees and TPWD State Parks considered risks from erosion and hurricane damage during evaluation of the Galveston Island State Park Beach Redevelopment project. In order to protect the redeveloped beach site from future weather events, beach erosion or subsidence, the proposed project would be set back from the shoreline, further inland than the original beachside camping facilities, which are now largely underwater due to Hurricane Ike and beach migration.

According to the Galveston Island State Park Master Plan, site planning along the beach would respond to a 50-year time horizon with elevated structures and transitional elements to respond to a changing coastal morphology. In response to subsidence, sea-level rise and beach migration anticipated at the Gulf beach over the coming decades, many of the beachside facilities would be elevated in order to protect these facilities from future flooding events and beach migration. Transitional facilities between elevated structures and at-grade recreation areas include dune walkovers, viewing platforms, picnic shelters, screened shelters and pavilions.

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<sup>51</sup> Tier I projects are those which will result in a direct impact of 3 acres or less of waters in the state or 1,500 linear feet of streams. The checklist includes BMPs for erosion control, post construction total suspended solids control, and sedimentation control.

The location and configuration of these beachside day and overnight facilities were evaluated in an alternatives analysis as part of the USACE permit application process. Their location relative to the beach and the existing Farm-to-Market (FM) 3005 (San Luis Pass Road) were evaluated in the report with the goal of building back beach facilities to minimize impact to natural and cultural features, preserve and enhance contiguous habitat (prevent habitat fragmentation), provide safe public access to the beach to meet public demand, and create facilities which are adaptive to future weather events and beach erosion. Design considerations included rising sea levels, beach subsidence, dune migration, habitat shifts, and beach erosion. The project design and location presented in this Phase III restoration plan is the preferred alternative selected in the permit application.

#### **8.13.6.1 Physical Environment**

Galveston Island is part of a series of barrier islands and bay-lagoon systems that separate much of the Texas coastal mainland from the Gulf of Mexico. Most undeveloped parts of Galveston Island are characterized by coastal prairies and marshlands with some areas containing coastal dunes. Habitats in the Galveston Island State Park project area include wetlands, bayous, coastal uplands and the beach/dune system.

The project area is located in remnant dune swale wetlands and bordered along the south by the beaches associated with the Gulf of Mexico. Current site conditions include of remnant camping facilities, including a road, and parking areas that were partially destroyed during Hurricane Ike. Most of the undeveloped areas within the project boundary are characterized by coastal prairies, marshlands and coastal dune swales. The county soil survey depicts the area as Mustang soils, which are deep, very poorly drained, very slow permeable soils formed in sandy sediments on barrier flats subject to occasional flooding due to high storm surge and are ponded after every rainfall. This general area has a bay to beach barrier island profile (USACE 2013).

The description of the physical environment of the project area is divided into geology and substrates, hydrology and water quality, air quality and greenhouse gas emissions, as well as noise characteristics of the area.

##### **8.13.6.1.1 Geology and Substrates**

###### ***Affected Resources***

The project area geology consists of recent barrier island deposits containing mostly sandy soils with limited silts and clays. The project area is generally flat to lightly rolling. The project area is subject to occasional flooding by high storm surges associated with tropical weather systems and is prone to ponding after heavy rainfall. Approximately 25 acres of palustrine wetlands exist within the project area.

The area between the Galveston Island State Park project and the Gulf waters consists of beaches composed of mainly sandy marine substrates with varied amounts of shell fragments. Beach sand is on the land area immediately adjacent to the Gulf from the median tide line to the back of the coastal dunes. It is reworked by tide and wind. The lower areas are inundated daily by high tides. Moving away from the Gulf and into the project area are soils on a series of old, abandoned beach ridges and wet swales that parallel the Gulf. The soil along the ridges tends to be nonsaline to moderately saline and moderately alkaline fine sand. These soils are rapidly permeable above the high water table and

therefore, there is little surface runoff. The soil in the wet swales is slightly to moderately saline and moderately alkaline very fine sand. Surface water on these soils is very slow to pond. These soils occasionally flood from storm tides and frequently flood from heavy rains. The majority of the project area has nonsaline and moderately alkaline, fine sand. These soils are rapidly permeable above the high water table with very slow surface runoff. This soil is occasionally flooded by storm tides and is susceptible to wind erosion if left unprotected after being disturbed.

The project area is located seaward of FM 3005 within the coastal prairie and beach/dune system that abuts the Gulf shore. Dunes approximately 80 to 120 feet in width were lost during Hurricane Ike, but some recovery of the frontal dune ridge has occurred due to the implementation of dune restoration methods including sand-fencing. A dune field buffer which is approximately 250-feet wide would be preserved. This area would be specifically reserved for dune field and wetland swale restoration, and allow for the natural migration of these systems. No development outside of the elevated beach access boardwalks and trails would be permitted in this buffer area. The construction of the boardwalks would help prevent human impacts to the vegetation. A designated, fenced horse-only trail would be installed to help prevent impacts to vegetation. Signs would be used to keep people and horses off of the dunes. If significant disturbance of dunes is identified anywhere in the buffer zone, fencing would be used to prevent access to affected areas of the dunes. Currently there is intermittent fencing present in the area. The boardwalks would be oriented at an angle to the shoreline face to deter wind erosion of dunes.

### ***Environmental Consequences***

Construction of all developments including those not paid for with Early Restoration funds would impact approximately 37 acres. A portion of the 37 acres is within the footprint of the campground area that was damaged as a result of Hurricane Ike. Soil in this area is not expected to be impacted more than it was in the original development.

During construction, contractors would remove soils and bring in fill materials to support the driveways, structures, and parking areas. Large equipment including front end loaders and bulldozers would be used to fill in low areas and level the sites before construction. Backhoes and trenching equipment would be used to install new water, electric, and sewer lines to connect to the existing public infrastructure. The beach access boardwalks would be constructed at a minimum of 3 feet above the dunes, and all impacts to dune vegetation would be minimized to ensure stability of the dune system. The height at which the beach access boardwalks are built would also take dune migration and growth into account. The construction of the boardwalks would help prevent human impacts to the vegetation. A designated horse-only trail would be fenced and would help prevent impacts to vegetation. The boardwalks from the campsites and facilities to the Gulf beach would condense foot traffic through designated pathways. This would reduce impacts to sensitive dune vegetation that lead to blowouts and weaknesses in the dunes that impact their protective function against storm surges. BMPs regarding erosion control would be employed which includes the planting of native vegetation near the campsites.

Alterations to soil through fill, compaction, grading, and earth moving activities would result in short-term and long-term minor adverse impacts to affected soils. However, the Galveston Island State Park project is reducing the area impacted compared to the facilities that were present pre-Hurricane Ike.

Specific impact minimization measures would be implemented during campground construction. These would include following established BMPs such as the implementation of an erosion control and storm water management plan, the installation of sediment traps prior to commencement of construction activities; and ongoing construction monitoring to ensure compliance. Project implementation will also adhere to the TCEQ Tier 1 checklist, which includes BMPs for erosion control, post construction total suspended solids control, and sedimentation control. The beach access boardwalks would provide long-term benefits to the dune habitats by minimizing human traffic through the dunes and limiting development within the dune buffer. The implementation of the proposed project would therefore result in short-term and long-term minor impacts to soils similar to what existed prior to Hurricane Ike.

#### 8.13.6.1.2 Hydrology and Water Quality

##### ***Affected Resources***

##### **Hydrology**

The project area is located on Galveston Island, Texas, which is a barrier island that separates the Gulf of Mexico from West Bay. The project area habitats include wetlands, bayous, coastal uplands and the beach/dune system. The Gulf Coast Aquifer underlies the island and is the main source of groundwater. In addition to the aquifer, the beach/dune system is supported by a hydrologic freshwater lens which is recharged by rainfall.

Wetlands within the project site are hydrologically associated with the Gulf of Mexico by groundwater connection. There are no streams within the project area and the flow of water is mostly subsurface. A beachside topographic survey and soil pit examination showed that the seasonal (winter and spring) high water table parallels the surface elevation. Based on prior studies it was surmised that groundwater movement follows the slope of the land's surface.

##### **Floodplain**

The project area is directly impacted by storms and storm surges which continue to alter the landscape and the adjacent wetlands. The existing campground facilities and proposed project area are within the 100-Year Floodplain.

##### **Water Quality**

Galveston Island, Texas has become extensively developed over the past decade with only a few pockets of undeveloped land left. This has led to more storm water runoff into the adjacent bays which sometimes exceed TMDL for bacterial content. There are restricted consumption advisories in West Bay for all species of catfish due to elevated levels of polychlorinated biphenyls (PCBs) and dioxin. In addition, there are restricted consumption advisories for tuna, jack, mackerel, shark, and bill fish species on the Gulf side of the project area due to elevated levels of mercury. Information regarding the recommended level of consumption for fish that could contain high mercury levels is described on the TPWD's website (<http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/general-rules-regulations/fish-consumption-bans-and-advisories>).

Onsite water quality is expected to improve by using wetlands to filter nutrients and metals from storm water. Existing impervious development would be deconstructed and removed. Runoff and rainfall is expected to filter through the sandy soils and enter into the groundwater. The existing and constructed



wetlands would likely be connected to the groundwater and would be able to naturally treat the water through natural wetland processes such as denitrification. It would help return the site's hydrology to a more natural state by both dampening runoff, and increasing the duration of wetland discharge to the water table and subsequent slow seepage of these cleaner waters into the Gulf and Bay.

### ***Environmental Consequences***

This project would alter hydrology at the site. Construction of the facilities, driveways, and parking areas would result in adverse modifications to the hydrology of the site over the long-term due the addition of impermeable surfaces. It has been anticipated that there would be approximately 15.61 acres of impervious surface cover from this project. However, this project is smaller than the original campground as it was designed pre-Hurricane Ike. The size of impervious area in the Park redevelopment is 2.7 acres less than the original pre-Ike development. This is a conservative approximation. Items such as the boardwalks and campsites may have surfaces which allow water to pass through. For additional details and maps, see the Galveston Island State Park Individual Permit Application (TPWD 2013a). Overall, the Galveston Island State project is expected to cause minor, short-term and long-term adverse impacts to the localized hydrology.

Executive Order 11988, Floodplain Management, requires that federal agencies avoid activities that directly or indirectly result in the development of a floodplain area. The required wetland mitigation is compensation for the lost floodplain values and may increase the floodplain storage for the project area. In addition, the Galveston Island State Park project is designed with beach access boardwalks, elevated structures, and transitional elements to reduce the amount of development within the floodplain as well as respond to a changing coastal morphology which is anticipated at the Gulf beach over the coming decades. Overall, the Galveston Island State project is expected to provide long-term benefits to the floodplain area.

Storm water runoff during construction may result in short-term, minor impact to surface water quality. The implementation of mitigation measures, including development of a comprehensive storm water pollution prevention plan, should reduce the intensity of the construction-related impacts to negligible. Additionally, horses and runoff from cars and other vehicles have the potential to impact water quality. Although this project does propose to create equestrian facilities, horses may currently use the Park. Impacts from horses could potentially have a long-term, minor effect on water quality. Overall, the Galveston Island State project is expected to cause minor, short-term and long-term adverse impacts to water quality.

#### **8.13.6.1.3 Air Quality and Greenhouse Gas Emissions**

### ***Affected Resources***

The project area is located in Galveston County, Texas and falls within an area the EPA designates as the Houston-Galveston-Brazoria Intrastate Air Quality Control Region (HGB). The HGB is in attainment or unclassified with the NAAQS for all criteria pollutants except ozone. The EPA currently lists the HGB as nonattainment for existing ozone standards.

Implementation of the Galveston Island State Park project would include transportation and heavy construction equipment, which may include bulldozer, barge, truck, backhoe, tractor trailer, front-end loaders, and crane.

### ***Environmental Consequences***

Project implementation would require the use of heavy equipment which would temporarily affect air quality in the project vicinity due to construction vehicle emissions. Excavation associated with construction of portions of the Galveston Island State Park project may produce fine particulate matter. However, this impact would be short-term, only occurring during active construction activities. Any air quality impacts that would occur would be localized and short in duration. During the permit review, the USACE determined the Galveston Island State Park project is of a small size, with minimal equipment used for construction and therefore, it clearly does not exceed the *de minimis* level for any criteria pollutant (USACE 2013). Therefore, any adverse impacts to air quality would be short-term and minor.

Available minimization practices would be employed to reduce the release of GHG during project implementation. The following measures have been identified to reduce or eliminate GHG emissions from the project:

- Shut down idling construction equipment, if feasible;
- Locate staging areas as close to construction sites as practicable to minimize driving distances between staging areas and construction sites;
- Encourage the use of the proper size of equipment for the job to maximize energy efficiency; and
- Encourage the use of alternative fuels for generators at construction sites, such as propane or solar, or use electrical power where practicable.

The use of gasoline and diesel-powered construction vehicles and equipment, including trucks, front-end loaders, forklifts, bulldozers, backhoes, and skid steers, would contribute to an increase in GHG emissions. Although it is difficult to develop an accurate estimation of total fuel consumption associated with construction vehicle and equipment operation, the following table describes the likely GHG emission scenario for the implementation of this project.

Based on the assumptions described in the table above, and the small scale and short duration of the project, predicted GHG emissions would be short-term and minor and would not exceed 25,000 metric tons per year, the threshold for triggering additional requirements for GHG emissions.

#### **8.13.6.1.4 Noise**

### ***Affected Resources***

The primary sources of ambient (background) noise in the project area are operation of vehicles, humans, recreational vessels, and natural sounds such as wind and wildlife. City noise is mainly from vehicles and also occasional human activities. The levels of noise in the project area varies, depending on the season, and/or the time of day, the number and types of sources of noise, and distance from the sources of noise.

**Table 8-10. Estimated greenhouse gas impacts.**

<b>EQUIPMENT<sup>52</sup></b>	<b>NUMBER OF 8-HOUR DAYS</b>	<b>CO<sub>2</sub> (METRIC TONS) <sup>53</sup></b>	<b>CH<sub>4</sub> (CO<sub>2</sub>e) (METRIC TONS) <sup>54</sup></b>	<b>NO<sub>x</sub> (CO<sub>2</sub>e ) (METRIC TONS)</b>	<b>TOTAL CO<sub>2</sub>e (METRIC TONS)</b>
Bulldozer	200	76.00	0.04	0.40	76.00
Front-end loader	280	98.00	0.06	0.56	98.00
Semi-tractor trailer	320	108.80	0.06	0.64	108.80
Rough terrain forklift	100	35.00	0.02	0.20	35.00
Ditch Witch boring unit	120	42.00	0.02	0.24	42.00
Pickup truck <sup>55</sup>	760	121.60	0.08	0.76	121.60
Backhoe	280	98.00	0.06	0.56	98.00
Skid steer	150	52.50	0.03	0.30	52.50
<b>TOTAL</b>		<b>631.90</b>	<b>0.37</b>	<b>3.66</b>	<b>631.90</b>

### ***Environmental Consequences***

Park visitors and wildlife may be sensitive to changes in noise sources or levels due to the Galveston Island State Park project. During the construction activity, there would be additional noise. However, it is expected that the activities would be performed during daylight hours, be temporary, and be within normal ranges for construction. Construction equipment and pile driving noise is known to disturb nesting shorebirds. Construction noise can also be a nuisance to residents living on the shorelines adjacent to project construction activities or to Park visitors.

Minimization measures that serve to limit noise during construction include: limiting activity at project sites to daytime hours; limiting truck traffic ingress/egress to the site to daytime hours; promoting awareness that producing prominent discrete tones and periodic noises (e.g., excessive dump truck gate banging) should be avoided as much as possible; and requiring that work crews seek pre-approval for any weekend activities, or activities outside of daytime hours. Because construction noise is temporary, any negative impacts to the human environment during construction activities would be short-term and minor.

Once facilities are constructed, noise can be generated from facility operations and the vehicles associated with these facilities. However, these noise levels would be representative of a campground

<sup>52</sup> Emissions assumptions for all equipment based on 8 hours of operation.

<sup>53</sup> CO<sub>2</sub> emissions assumptions for diesel and gasoline engines based on EPA 2009.

<sup>54</sup> CH<sub>4</sub> and NO<sub>x</sub> emissions assumptions and CO<sub>2</sub>e calculations based on EPA 2011b.

<sup>55</sup> Emissions assumptions for an 8 cylinder, 6.2 liter gasoline engine Ford F150 pickup based on DOE 2013 and 18 gallon (half-tank) daily fuel consumption.

and similar in nature to those generated prior to the hurricanes. Overall, long-term noise effects from personal vehicle use, swimming and other recreational activities would be minor.

#### **8.13.6.2 Biological Environment**

The park features 2,000 acres of upper Gulf Coast barrier island ecosystem. Barrier Islands move and change constantly through the action of waves, wind and tides. Because barrier islands serve as transition zones between land and ocean, they support a variety of distinct eco-regions, including beaches, prairies and wetlands. Each supports a diverse array of life. The biological environment is divided into two sections: living coastal and marine resources, and protected species.

A threatened, endangered, and rare species habitat assessment as well as an alternatives analysis were prepared and submitted to the USACE for review as part of the Individual Permit Application (TPWD 2013a). This summation is not fully inclusive of the extensive information found in the Individual Permit Application (SWG-2012-00631). Readers should reference the Environment Assessment for complete information.

##### **8.13.6.2.1 Living Coastal and Marine Resources**

###### ***Affected Resources***

###### **Flora**

The project area contains beach, dune, and grassland prairie habitats that have interspersed wetlands. The grassland prairie contains mixed shrub and grass sites and/or woody plant dominated areas. Although there are many plant species in the area, the Park was historically over grazed and still has not fully recovered. The uplands at Galveston Island State Park, especially those on the beach side, is now dominated by early successional species such as western ragweed, bushy goldentop, dewberry, rosette grass, and witch grass with little or none of the tall grasses needed as cover by nesting mottled ducks or migratory grassland birds and other wildlife. The beach/dune habitat is constantly changing as a result of sand transport from winds and storms. The Galveston Island State Park project lies within the Marsh/Barrier Island vegetation type. This area is distributed in the barrier islands along the Gulf Coast, with Sea oats-Seacoast Bluestem Grassland distributed from high tide mark to leeward marshes on sandy coastal barrier islands. These habitat types support a unique array of plant and animal communities. Some commonly associated plants within this area include: croton, single-spike paspalum, Pan American balsam scale, flat sedge, sea purslane and cenicilla, bulrush, beach morning glory, goat foot morning glory, sea rocket, and lime pricklyash.

###### **Fauna**

Galveston Island State Park contains a mosaic of coastal habitats that host a variety of wildlife and is visited by birds from throughout the eastern hemisphere during the spring and fall migration seasons. Wading and shore birds, mottled and mallard ducks, raccoons, armadillos and marsh rabbits are found in the Park, which is ideal for wildlife observation and photography. Beach or surf fishing for spotted seatrout, sandtrout, redfish, black drum, croaker and flounder is also popular.

###### ***Environmental Consequences***

Campground development would likely adversely impact native vegetation. Efforts would be made to limit the removal of native vegetation. The construction of the boardwalks would help prevent human

impacts to the vegetation. A designated horse-only trail would be fenced and would help prevent impacts to vegetation. Signs would be used to keep people and horses off of the dunes. Currently, there are about 40 signs planned along the dunes facing the beach. If significant disturbance of dunes is identified, fencing would be used to prevent access to the dunes. Currently there is intermittent fencing present in the area. Horses are restricted to the winter months and to the beach. Due to the saline environment of the beach front, the chances of invasive species being introduced through hay is greatly reduced. Although Bermudagrass is saline-tolerant, it is already pervasive in the dune area.

Native vegetation would be managed as part of the campground maintenance plan. Efforts to identify and eliminate any non-native plant species would be implemented. The management of Galveston Island State Park natural resources includes restoring native plant communities to their Pre-European settlement condition. Native strand prairie will be restored on the existing dune ridges that lie between the swales containing the existing and proposed mitigation wetlands. Strand prairie is made up of a subset of tall-grass prairie species tolerant of somewhat salty soil resulting from salt spray and hurricane storm surge. The species to be used include: little bluestem, Gulf muhly, Gulf dunes paspalum, and brown seed paspalum. The remaining roadway, parking lots, and temporary buildings not overlain by the new facility footprint will be restored to native plant communities, mostly upland strand prairie, once replacement facilities are constructed. Although some vegetation would be removed, the short-term and long-term impacts overall would be minor given the area affected.

During construction activities, there would be short-term adverse impacts to wildlife species in the project vicinity associated with increased noise, land clearing activities, and the presence of construction equipment. Sufficient habitat is present near the project area for wildlife to relocate during construction activities. Many mobile wildlife species would avoid areas near or within construction areas. However, species would likely return to the area after activities cease. There is sufficient suitable feeding and resting habitat available along the Gulf beaches to support additional bird use. The increase in human activities at the Park is not expected to exceed the effect that was present pre-Hurricane Ike. Overall campground construction would be expected to have short-term minor impacts on wildlife species, as well as beneficial long-term impacts to dune habitat from the beach access boardwalks.

To prevent any invasive species from becoming established during project construction, equipment, materials, and disturbed areas would be monitored for invasive species. If invasive species are observed, appropriate treatment methods will be used to remove them. In addition, if there is any revegetation following construction activities, only native species would be used. An invasive species of particular concern at Galveston Island State Park is Guinea grass, which State Park is already treating and eradicating when observed. The USACE determined during their review of the permit application that the construction methods proposed for the Galveston Island State Park project would not introduce any new or additional invasive species within the project area (USACE 2013). In addition, the wetland mitigation plan contains invasive species eradication and monitoring (TPWD 2013a).

#### **8.13.6.2.2 Protected Species**

Protected species and their habitats include ESA-listed species and designated critical habitats, which are regulated by either the FWS or the NMFS. Protected species and habitat also include marine mammals protected under the Marine Mammal Protection Act, essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act, migratory birds protected

under the Migratory Bird Treaty Act and eagles protected under the Bald and Golden Eagle Protection Act. The Galveston Island State Park project would be developed approximately 200 feet inland from the Gulf shoreline (mean high water), therefore the no EFH as described by the Magnuson-Stevens Fishery Conservation and Management Act occurs in the project area. The discussion that follows focuses on species protected by the Endangered Species Act, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act.

### **Endangered Species**

Section 6 of the Individual Permit Application (SWG-2012-00631) addresses Threatened, Endangered, and Rare Species that may be impacted by the Galveston Island State Park project (TPWD 2013a). No federally-listed species or other species of concern under the NMFS's jurisdiction are expected to be in the project area due to the Galveston Island State Park project location and habitat conditions. The project area contains suitable habitat for the following federally-listed and proposed species: Eskimo curlew, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, piping plover, and red knot. There is no designated or proposed critical habitat for federally-listed, proposed, or candidate species in the project area.

Eskimo curlews are presumed to be extinct because they have not been observed since the 1960s. If by happenstance this species is identified in the project area during construction of the project, construction would cease and FWS would be contacted to determine protective measures for this species.

Beach areas that could be used for sea turtle nesting activities are located within the project footprint. Although nesting habitat for the five sea turtle species is present, only the Kemp's ridley is known to nest on Galveston Island. Sea turtle nest detection patrols occur on the entire Texas Gulf of Mexico beachfront during the sea turtle nesting season in coordination with the National Park Service's Sea Turtle Recovery Project. Any sea turtle nests located are excavated and the eggs are relocated to Padre Island National Seashore, on the southern Texas coast, for incubation.

Only the beach access boardwalks are proposed for construction in potential beach nesting area. TPWD directives and standard operating procedures ensure project construction in potential nesting areas would be completed outside of the nesting season. Therefore, the construction of beach access boardwalks (the only proposed development that would affect sea turtle nesting) has been scheduled to avoid nesting season, which extends from April 1 until October 1. In addition, equestrian use is not anticipated to impact sea turtles since horses are only permitted on the Park beach during the winter months (outside of turtle nesting season).

Piping plovers do not nest at Galveston Island State Park, but could occasionally use the sandy areas near the dunes and the beach during the non-breeding season. Only beach access boardwalks are proposed for construction in these habitats. Wintering habitat preferred by piping plovers in Texas includes very sparsely vegetated tidal mudflats, sand flats, or algal flats. Although Galveston Island does contain piping plover critical habitat, no designated critical habitat for piping plover exists within the project area. Red knots (proposed for listing) are primarily found in intertidal marine habitats in Texas. They rely on shoreline habitat for feeding and resting.

### **Bald and Golden Eagles**

There are no golden eagles present within Galveston Island State Park. On rare occasions bald eagles may fly over the Park.

### **Migratory Birds**

Located along the Greater Texas Coastal Birding Trail, Galveston Island State Park serves as a rest stop for many species of migratory birds traveling the Central Flyway. Migratory birds are also protected under the Migratory Bird Treaty Act. Nesting of migratory birds is not known within the project area, but is possible. Bird rookeries are not within or near the project area.

There are over 270 species of migratory birds that are present during at least part of the year at Galveston Island State Park. Of these species, only a few have the potential to nest within or near the proposed Galveston Island State Park Beach Redevelopment project.

### ***Environmental Consequences***

Impacts to protected species and their habitats may occur during construction of portions of the Galveston Island State Park project, but would be localized. Disturbance to individual species would occur in the construction areas; however, there would be no change in the diversity or local populations of protected species.

The redevelopment would have no effects on nesting sea turtles. Only Kemp's ridley sea turtles are known to nest on Galveston Island. Park lights are not a concern for these sea turtles because they nest during the day and eggs from any sea turtle nests observed would be relocated in coordination with the National Park Service's Sea Turtle Recovery project. Additionally, construction of the beach access boardwalks within the nesting area would be conducted outside the nesting season.

Piping plovers and red knots could be in the project area, therefore actions to minimize potential impacts to these species will be taken during construction.<sup>56</sup> Actions to minimize impacts include having an onsite monitor, avoiding work after dark, maintaining a speed limit of 10 miles per hour, and stopping work if the birds are observed foraging within 100 feet of the work site. The onsite monitor would have stop work authority and would be present at the site when construction is occurring. The trained monitor would survey the area daily prior to the initiation of any construction activity and periodically throughout the day. If vehicles or equipment are left in the project area, the areas around the tires would be surveyed before moving the vehicle. The monitor would keep a daily log documenting all surveys conducted.

It is possible that migratory birds may nest in the project area. There would be enough disturbances to displace or destroy nests, eggs or chicks. Therefore, at least the initial site access, clearing, and construction effort would be conducted outside of the spring nesting season (March 15 to July 1). Once the site has been cleared and construction commenced, nesting birds would avoid the construction area

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<sup>56</sup> Since the Red Knot is a proposed species (not federally-listed), these recommendations are discretionary. If this species becomes listed prior to completion of the proposed project, then the special management practices would apply to the red knot. Regardless, the special management practices will be implemented in areas that may have piping plovers.



and further work can occur throughout the year. Construction activities would produce enough noise and disturbance to prevent birds from nesting in the area, thereby preventing impacts to nesting birds.

The designated paths to the beach (boardwalks) would concentrate visitors to the south side of the beach and minimize effects to wildlife and habitats by protecting the dunes and reducing the area of impacts. The camping facilities are proposed to house fewer sites than what was present pre-Hurricane Ike. Therefore, this development is not expected to increase impacts beyond what was previously present. Any impacts to protected species if they occur at all would be expected to be short-term and minor.

The ESA consultation has been completed. FWS concurred that the proposed Galveston Island State Park project may affect, but is not likely to adversely affect piping plover or red knot (if listed). The project was also reviewed for impacts to bald eagles and migratory birds in accordance with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Actions to minimize impacts will be implemented during project construction to prevent take of migratory birds or bald eagles (FWS 2014a).

#### **8.13.6.3 Human Uses and Socioeconomics**

In addition to the ecological significance of its natural resources, and the diversity of its habitats, the Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the Gulf coast and the United States. This section includes discussions of socioeconomics and environmental justice conditions, cultural resources, land and marine management activities that are pertinent to Early Restoration, aesthetic and visual resources of the region, tourism and recreational use in the area, infrastructure, and a general characterization of public health and safety issues as well as shoreline protection.

##### **8.13.6.3.1 Socioeconomics and Environmental Justice**

###### ***Affected Resources***

In 2012 the population in Galveston County was estimated to be over 300,000 which accounted for just over 1% of the Texas population. Approximately 59% of the population in Galveston County is white (not Hispanic or Latino), 23% is Hispanic or Latino, 14% is black or African American, and 3% is Asian. Around 18% of the county population speaks a language other than English at home. Median household income (2007-2011) in Galveston County and the state is \$59,645 and \$50,920, respectively, with 13% of the county and 17% of the state living below the poverty level (U.S. Census Bureau 2013).

Tourism is an important socioeconomic component of Galveston, Texas and Galveston Island State Park averaged 250,000 visitors per year prior to Hurricane Ike. Due to the destruction of the facilities in 2008, visitation to the Park has dropped off substantially. Galveston Island State Park is an important component to the recreation and social value of the island. The Park is a stop on the Great Texas Coastal Birding Trail and a popular destination for birders. Reconstruction of the Park's visitor check-in station, camping facilities, amenities, and day use parking should increase visitation and expenditures at local restaurants, shops, and convenience stores. Staffing levels at the Park prior to Hurricane Ike included 16 full-time personnel and 5 seasonal positions. In comparison, current staff levels are 10 full-time personnel and four seasonal positions. It is anticipated that staffing levels would return to pre-Ike levels after completion of the Galveston Island State Park project.

### ***Environmental Consequences***

Construction materials are generally purchased from the local area. If a local contractor is awarded the bid, this would provide stimulus to local businesses. Any contractor mobilization to the area would provide stimulus to local service industries. TPWD has predicted that there would be an increase in recreational use of the Park as a result of this project. Increased visitation would benefit the local economy and could lead to the need for additional staff at the Park. It is anticipated that six new full-time positions and one new seasonal position would be created after completion of the Galveston Island State Park project. Galveston Island State Park would also see increases in revenue. There would be indirect beneficial effects to the local economy due to increased recreational and tourist activity in response to campground and other recreational improvements at the Park. These economic benefits would be concentrated in the service and retail industry sectors. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. Overall, socioeconomics would not be adversely impacted as a result of the proposed project. The project is expected to have a positive beneficial impact to the local economy through indirect benefits associated with visitation to the Park and tourism.

#### **8.13.6.3.2 Environmental Justice Analysis**

In this analysis, a county is considered to have a minority population if its nonwhite population is greater than 50% or is meaningfully larger than the general (statewide) nonwhite population. Low-income areas are defined as counties in which the percentage of the population below poverty status exceeds 50%, or is meaningfully greater than the general population (average statewide poverty level). To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population.

The Trustees find that this project location does not meet the criteria for determining that disproportionately high and adverse effects would likely fall on minority or low-income populations. Galveston County is not considered to be minority and low income. There are no adverse effects to low income or minority populations anticipated from the proposed project.

As part of the permit application review process, the USACE determined there is no adverse human health or environmental effects from the project upon minority and low income populations of the United States (USACE 2013).

#### **8.13.6.3.3 Cultural Resources**

##### ***Affected Resources***

Galveston Island State Park was severely impacted by Hurricane Ike in 2008. TPWD worked with the Texas Department of Transportation to remove debris. Prior to the debris cleanup project, TPWD consulted with the Texas Historical Commission under Section 106 of the National Historic Preservation Act, and the Texas Historical Commission concurred with the cleanup plan. Two archeological surveys

were conducted within the project area, covering of 103 acres in Galveston Island State Park. The area surveyed is on the Gulf beach side of the Park, southeast of FM 3005. Pedestrian survey and intensive shovel testing found no archeological sites in the 103-acre survey area (which includes the proposed project area) on the Gulf beach front of the Park. A comprehensive cultural resources report was submitted with the USACE permit application. The results of the investigation were coordinated with the Texas State Historic Preservation Officer, who then provided concurrence that there would be no effect to cultural resources as a result of this project. In addition, the National Register of Historic Places has been consulted and no properties are listed in the permit area.

As part of the permit application review process, the USACE initiated coordination with the appropriate Indian Tribes. No response was received from any federally recognized Native American Tribes and/or affiliated groups (USACE 2013).

A complete review of this project under Section 106 of the National Historic Preservation Act would be completed as environmental review continues. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of the cultural and historic resources.

### ***Environmental Consequences***

No cultural resources are expected to be impacted by this project. The development of the part of the Park southeast of FM 3005 would not affect any cultural resources that are eligible for listing in the National Register of Historic Places or designation as State Archeological Landmarks. No further cultural resources work is recommended for this part of the Park. A complete review of this project under Section 106 of the National Historic Preservation Act is ongoing and would be completed prior to any project activities that would restrict consideration of measures to avoid, minimize or mitigate any adverse effects on historic properties located within the project area. This project would be implemented in accordance with all applicable laws and regulations concerning the protection of cultural and historic resources.

### **8.13.6.3.4 Land and Marine Management**

#### ***Affected Resources***

The Galveston Island State Park project is located within Galveston Island State Park on state-owned lands. Surrounding land uses include residential neighborhoods with mixed retail northeast and southwest of the Park. FM 3005 runs through the Park connecting residential areas of Galveston Island. The addition of these amenities to the Park is in accordance with the Galveston Island State Park Master Plan (TPWD 2011) and would meet several objectives of TPWD's Land and Water Resources Conservation and Recreation Plan (TPWD 2013b). Additionally, Galveston Island State Park operates under the guidance of TPWD's State Park Division Plan (TPWD 2012a). All standards and provisions of these plans and relative regulations would be adhered to, including Texas State Park Operational Rules (Title 31, Texas Administrative Code Chapter 59) and Texas Accessibility Standards issued under the authority of the Texas Government Code, Chapter 469. The Federal Trustees reviewed the Texas projects for consistency with the Texas Coastal Management Program and found that, as best as can be determined at this level of planning, these proposed restoration actions are, and will be undertaken in a manner that is, consistent with the applicable, enforceable policies of the State's program (Federal Trustees 2013). TGLO concurred with the Federal Trustees' consistency determination that the project

would be implemented in a manner that is consistent with the applicable, enforceable policies of the Texas Coastal Management Program (TGLO 2014).

#### ***Environmental Consequences***

The Galveston Island State Park project would not change the current land use, zoning, or cause any amendments to management plans that relate to the project area. The area would remain designated for open space recreational use, which allows for developed camping facilities and other structures related to outdoor activities such as boating and fishing. Land use and management authority at the Park would remain under the purview of the TPWD, and development at the Park would comply with the guidance established for coastal recreational land uses and the requirements of the Coastal Zone Management Act. Thus, no impacts would occur to Land and Marine Management under the proposed project.

#### **8.13.6.3.5 Aesthetics and Visual Resources**

##### ***Affected Resources***

The general visual character of this region can be described as semi-urban, with surrounding areas maintaining a low-density residential quality representative of current and historic land uses. Residential communities in this region are interspersed with commercial developments located along major roadways, with some larger areas remaining in agricultural use or as undeveloped open space. The topography is flat to gently sloping. Most recreational activities on site involve the use of the natural setting. For example, activities such as bird watching and fishing benefit from the natural settings to enhance experiences. The redevelopment proposed in this project enhances recreational experiences while maintaining a small footprint, which is an objective in the Galveston Island State Park Master Plan. During the redevelopment construction, the materials, workers, and equipment would be staged adjacent to the worksites. The proposed construction is consistent with the surrounding structures and typical of amenities located within Texas coastal state parks.

##### ***Environmental Consequences***

Temporary impacts to visual resources would result from construction of the proposed Galveston Island State Park project. Large construction equipment such as backhoes for campground construction would temporarily obstruct the shoreline views for visitors and recreational users at the site. The addition of the structures would change the viewshed, but the construction would be consistent with the other amenities located in the Park. The structures would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Any adverse impacts to aesthetic and visual resources would be short-term and minor.

#### **8.13.6.3.6 Tourism and Recreational Use**

##### ***Affected Resources***

Galveston Island State Park averages 250,000 visitors per year, but since the Park was severely damaged by Hurricanes Ike visitation dropped significantly due to the lack of available facilities. The Park is a stop on the Great Texas Coastal Birding Trail and remains popular destination for birders. The Park is also a popular day use and Gulf beach access point for visitors from the Houston/Galveston metro areas. In addition, visitors come to fish, kayak, and view wildlife. There are three paddling trails and ten foot trails located in the Park (Figure 8-41). The shoreline itself is popular for walking and horseback riding is

allowed on the beach. The Park transects the island and provides visitors with a complete view of the habitats that exist from the Gulf beach to the bays on barrier islands. Galveston Island State Park is a popular destination for local schools and education programs that use the Park as an outdoor laboratory and learning venue.

Galveston Island State Park has historically been one of the most visited state parks in Texas. It serves local and national tourists, especially residents of nearby Houston and Galveston. Redevelopment of the Gulf beachside facilities is necessary to meet the public demand for visitors of the Gulf Beach on Galveston Island. Development of the proposed Galveston Island State Park project is expected to generate economic benefits throughout Galveston County as visitor expenditures, including food service, lodging, fuel, retail, and recreation purchases, would increase with additional tourism. The redevelopment of the Galveston Island State Park beach-side, and the subsequent increase in number of visitors, would serve to benefit the economy of TPWD, Galveston Island, and the county as a whole.



Figure 8-41. Map of trails within Galveston island State Park.

Only 33 camping facilities continue to function at the Galveston Island State Park beachside following the destruction by Hurricane Ike. These camping facilities are insufficient to meet public demand, which, prior to Hurricane Ike, numbered 150 multi-use campsites. Post-Ike public input has consistently shown an interest in greater capacity. In order to meet the objective of the TPWD for Galveston Island State

Park, the Gulf beachside recreation facilities would have to provide public access to the beach in a way that is safe, convenient, and sufficient to accommodate the beach-going public.

There are no equestrian facilities located in the Park at this time though horses can access the beach from adjacent city-owned access areas on either end of the Park. Horses are allowed on the beach from November 1 through February 28. Equestrian corrals and facilities would be part of the new construction.

### ***Environmental Consequences***

During the construction period, recreational experience would be impacted from noise and visual disturbances associated with the use of heavy equipment. Access to certain areas could also be restricted or impacted to some degree during construction activities. During construction, it would be necessary to close portions of the Park to public access to ensure public safety. However, this would be limited to the amount of time necessary to complete the construction and would be reopened after completion. Day use parking lots would remain open to allow for public beach use during construction until the new parking areas are completed. The construction may have moderate impacts to public access and use of the beach. While these temporary inconveniences would result in moderate short-term impacts on tourism and recreational use during the construction and rehabilitation activities at the shoreline, over the long-term improved access and enhanced facilities would result in substantial benefits to tourism and recreational use. Opportunities for recreational activity at the shoreline would be enhanced over the long-term as a result of the construction of the campground, resulting in beneficial effects to tourism. Overall, the implementation of the proposed Galveston Island State Park project would contribute positively to visitor experience and public access. Any adverse impacts to tourism and recreational use would be short-term and moderate.

#### **8.13.6.3.7 Infrastructure**

### ***Affected Resources***

Current facilities at Galveston Island State Park include 33 Gulf beach-side campsites with water and electricity for recreational vehicles or tents, 20 bay-side recreational vehicle sites with water and electricity and 10 bay-side tent sites with water only. There are two restroom buildings with showers located in the beach camping areas and one restroom building with showers in the bay tent camping loop. The Gulf beach-side day use area has parking for approximately 205 cars. Also included are 29 picnic tables with shade covers, 4 changing rooms, and 1 restroom building.<sup>57</sup>

The new beach side entrance to the Park would be located 400 yards to the west of its current entrance on FM 3005. The new design allows for more space to cue RV's and vehicles entering the Park. Current conditions often allow for vehicles to back up to the highway during busy days. It is anticipated that new turn lanes and acceleration and deceleration lanes would be added to FM 3005. These improvements would not be funded through DWH Early Restoration funds.

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<sup>57</sup> While the permit specifies the number of each improvement (campsites, boardwalks, etc.) that is planned and approved by the USACE, DWH Early Restoration funds will only fund a portion of the total number.



The Park was initially planned to use utilities at a capacity that would not exceed pre-Ike demands. Storm water would be directed to constructed wetlands. There are plans as part of a Texas Department of Transportation Project to redirect overflow from the wetlands to the ditches on the bay side of Galveston Island State Park. Proposed utilities would be replacing those lost from Hurricane Ike. Center Point Energy supplies electricity to the site and anticipates the redevelopment and would be providing power.

Utilities for the new developments would include water, sanitary sewer, and electrical. These utilities would be installed below ground. Current electrical lines running through the proposed construction areas would be relocated to the main highway by the power company at their expense. Park sewer lines are connected to City of Galveston via pressure lines. Although dump stations are planned as part of the campground improvements, they would be paid for by a separate funding source. Storm water would be routed to in wetlands and/or ditches.

### ***Environmental Consequences***

The Galveston Island State Park project would not impact any existing public infrastructure or road, but it may temporary impact Park facilities during the alteration of water and power lines, and staging of materials. Aside from improvements to basic sanitation facilities and the extension of electrical utility lines at the proposed campground, there would be no changes to infrastructure or additional public utility requirements under the proposed project. Electrical demands would exceed what is currently being used but are not expected to exceed the capabilities of feeder lines that were used previously. Current electrical lines running through the proposed construction areas would be relocated to the main highway by the power company at their expense. Park sewer lines are connected to City of Galveston via pressure lines. No capacity upgrade to the utility connections (including water services) would be needed.

Construction waste would be removed by the contractor to an appropriate landfill using dump trucks and roll-off dumpsters or as specified by TPWD Infrastructure contracts. The current closest landfill is located in Santa Fe, Texas, 26 miles away. The landfill is utilized by Galveston County residents. The landfill capacity has not been reached. The impacts to parking, roads, and facilities would be localized and within the Park. Construction activities may temporarily alter the operational capacities of the Park. While there would be no impact to day-use visitation, overnight beach-side camping would be suspended during construction. These facilities would be torn down to make room for the new campsites.

The new design of the beachside Park entrance and modifications to FM 3005 would allow more space for cars to line up and remain off the highway. During the construction activities, there would be short-term disruptions of parking and public access to facilities within the Park, but over the long-term the project would enhance public access and recreational opportunities. Any adverse impacts would be short-term and minor.

### **8.13.6.3.8 Public Health and Safety and Shoreline Protection**

#### ***Affected Resources***

The Galveston Island State Park project and its construction are not anticipated to generate hazardous waste or the need for disposal of hazardous waste. All waste generated during the construction of the



amenities would be disposed in the appropriate waste or recycle collection receptacles in the Park or hauled off to an approved waste disposal site. All occupational and safety regulations and laws would be followed to ensure safety of all workers and the public.

In order to protect the redeveloped Gulf beach site from future weather events, beach erosion or subsidence, the proposed project would be set back from the shoreline, further inland than the original beachside camping facilities, which are now largely underwater due to Hurricane Ike and beach migration. According to the Galveston Island State Park Master Plan (TPWD 2011), site planning along the beach would respond to a 50-year time horizon with elevated structures and transitional elements to respond to a changing coastal morphology. In response to subsidence, sea-level rise and beach migration anticipated at the Gulf beach over the coming decades, many of the beachside facilities would be elevated in order to protect these facilities from future flooding events and beach migration. Transitional facilities between elevated structures and at-grade recreation areas include beach access boardwalks, tent campsites, and picnic shelters.

### ***Environmental Consequences***

Providing safe beach access was established as a project goal in considering alternatives for the project (TPWD 2013a).

The Galveston Island State Park project is designed with elevated structures and transitional elements to respond to a changing coastal morphology, in response to subsidence, sea-level rise, and beach migration anticipated at the Gulf beach over the coming decades.

No hazardous waste would be created during construction of the redevelopment. All hazardous materials handled during construction would be contained and appropriate barriers would be in place to ensure the protection of adjacent water resources from potential spills and leaks. In the event of a discharge of oil or release of hazardous substances, the release would be reported to the National Response Center (800-424-8802) and Texas Emergency Oil Spill and Hazardous Substance Reporting line (800-832-8224) as required. BMPs in accordance with Occupational Safety and Health Administration and state and local requirements would be incorporated into construction activities on site to ensure the proper handling, storage, transport and disposal of all hazardous materials. Personal protective equipment would be required for all construction personnel and authorized access zones would be established at the perimeter of the worksite during construction. Soil and sediment stabilization measures would be incorporated into the Galveston Island State Park project design as needed in areas where the potential exists for erosion to occur in order to protect resources and ensure public health and safety. No adverse effects to public health and safety and shoreline projection are expected as a result of this project.

### **8.13.7 Summary and Next Steps**

Per the Purpose and Need of the Phase III ERP/PEIS, four programmatic alternatives are considered, including a no action (Alternative 1), project types emphasizing habitat and living coastal and marine resources (Alternative 2), project types emphasizing recreational opportunities (Alternative 3), or a combination of both habitat and living coastal and marine resources and recreational opportunities (Alternative 4).

The proposed Galveston Island State Park project would redevelop the beach side of Galveston Island State Park by building new facilities, including multi-use campsites, tent campsites, beach access boardwalks, equestrian facilities, a visitor check-in station, and restroom and shower facilities. The project is consistent with Alternatives 3 (Contribute to Providing and Enhancing Recreational Opportunities) and Alternative 4 (the Preferred Alternative).

The NEPA analysis of the environmental consequences suggests that minor adverse impacts to some resource categories, moderate short-term impacts to tourism and recreational use, and no major adverse impacts are anticipated to result. This restoration project would enhance visitor use and enjoyment of Park resources. The Trustees have started coordination and reviews under the National Historic Preservation Act and other federal statutes, where appropriate. The Trustees have completed consultations and reviews under the Endangered Species Act, Magnuson-Stevens Fishery and Conservation Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Section 404 of the Clean Water Act, and Coastal Zone Management Act. Implementing Trustees will adopt and are required to implement project-specific mitigation measures (including BMPs) identified in the Final Phase III Record of Decision and completed consultations/permits. Oversight will be provided by the implementing Trustees. If effects to listed species or their habitat differ from the effects subject to consultation, including unintended consequences to such species, the trustees would initiate (if no effect originally concluded) or re-initiate (for completed consultations) consultations with the regulatory agencies. Trustees would conduct due diligence with regard to ensuring no unanticipated effects to listed species and habitats occur, including ensuring that BMPs are implemented and continue to function as intended. The Trustees have considered public comment and information relevant to environmental concerns bearing on the proposed actions or their impacts. Final determination on this project will be included in the Record of Decision.

#### 8.14 Cumulative Impacts

The CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. The regulations (40 C.F.R. §1508.7) define cumulative impacts as the:

*impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.*

In the context of the Phase III Early Restoration Program, cumulative impacts assessment requires the Trustees to (1) define appropriate spatial and temporal boundaries for the analysis; (2) describe baseline environmental and/or socioeconomic conditions for affected resources within the spatial and temporal boundaries; (3) identify past, present and reasonably foreseeable future government and private actions that could have or contribute to potentially significant impacts on the affected resources; and (4) characterize the cumulative impacts of the proposed project assuming implementation of the other present and reasonably foreseeable future actions.

Although Early Restoration encompasses projects located across hundreds of miles of Gulf of Mexico coastline, a cumulative analysis of all impacts across the Gulf is not practically feasible. Given the broad

geographic scope of the Phase III program, the requirement for cumulative impacts analysis poses unique challenges. In addition to the programmatic cumulative impacts analysis (See Chapter 6), the Trustees have developed a cumulative impacts analysis around discrete, state-by-state, spatially-based or temporally-based project groupings that focus the analysis on areas where projects would occur (e.g., watersheds, estuaries or counties). The analysis focuses on those affected resources for which proposed projects have a potential contribution to cumulative impacts. This state-by-state analysis is designed to supplement the programmatic cumulative impact analysis found in Chapter 6. Following the CEQ guidance for scoping cumulative analyses, the goal is not to capture every theoretically possible impact, but instead ‘to count what counts.’ Defining spatial boundaries in this manner also facilitates identification and analysis of existing environmental and socioeconomic conditions.

The cumulative impacts analysis depends heavily on the availability of information and data about past, present, and likely future actions. For the analysis of the Phase III projects, the Trustees identified past, present, and potentially significant future actions through consultations with local, state and federal environmental experts familiar with major environmental and development initiatives that have a potential to contribute substantially to cumulative impacts. In some cases, environmental analyses of reasonably foreseeable future actions are available to inform the Trustees’ analyses. But in the absence of such completed analyses, the Trustees generally had to rely on expert judgments, primarily qualitative, about the potential for impacts, using publicly available information about the likely design and location of these actions.

For the Texas Early Restoration projects, the Trustees believe the cumulative impact analyses discussed here represent best estimates of how current environmental and socioeconomic conditions may be changed by the proposed actions when their impacts are combined with other past, present, and reasonably foreseeable future actions. However, cumulative effects analysis remains subject to uncertainties and data limitations. Nonetheless, because the proposed Texas Phase III Early Restoration projects are all designed to increase public access and/or enjoyment of natural resources, the Trustees concluded that although some of the projects may have an incremental contribution to adverse cumulative impacts, the contribution would not be substantial over the long-term. The reasons for this conclusion are detailed in the remainder of this chapter.

#### **8.14.1 Spatial and Temporal Boundaries for Texas Projects**

In order to identify the past, present, and reasonably foreseeable future actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries must be identified. The spatial boundary is the area where past, present, and reasonably foreseeable future actions have, are, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the alternatives being considered. The temporal boundary describes how far into the past and forward into the future actions should be considered in the impact analysis. Appropriate spatial and temporal boundaries for the Texas projects are described in the following sections.

##### **8.14.1.1 Spatial Boundaries**

In developing the following cumulative impact analysis, the cumulative actions discussed in Chapter 6 were considered (e.g. marine transportation, oil and gas, etc.). As part of the cumulative analysis, past, present, and reasonably foreseeable future actions were identified (past actions are considered part of

the existing conditions which were analyzed in the individual environmental reviews). This analysis considers the incremental contribution of proposed Phase III early restoration projects to potential cumulative impacts to resources discussed in Chapter 3. The analysis includes resources that are relevant to the concerns identified on the regional scale.

The Phase III Early Restoration projects proposed in Texas are physically separated from each other, with distinct habitat types and functionally different. The projects were grouped by habitat type and function. Groups were analyzed for past, present, and reasonably foreseeable future actions which have, are, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the projects being considered. Texas projects have been grouped based on the similarity of habitat and function (Figure 8-42):

- Group 1: Artificial Reef Projects;
- Group 2: State Park Projects.



**Figure 8-42. Location of all Phase III Early Restoration projects proposed in Texas. Group 1 (Artificial Reef Projects) is labeled in blue and Group 2 (State Park Projects) is labeled in green.**

The proposed artificial reef projects (Matagorda Artificial Reef, Freeport Artificial Reef, and Ship Reef or Corpus Artificial Reef<sup>58</sup>) would all be placed in similar nearshore habitats in the Gulf of Mexico off the coast of Texas. All of the projects are under the purview of the same TPWD regulatory codes, as well as TPWD's Artificial Reef Program management objectives, operating plans, and senior staff. Additionally, all of the proposed reef projects would be or have been subject to the same decision-making process for selecting reef sites and materials as well as for prioritizing sites. The proposed reef projects would also be subject to the same standard operating protocols and guidelines for construction, development, and assessment. Due to the similarity of construction guidelines, and habitats where the artificial reefs would be located, all reef projects are combined for purposes of an analysis of cumulative effects.

The proposed state park projects (Sea Rim State Park Improvements Project and Galveston Island State Park Beach Redevelopment Project) are located along the northern Texas coast on coastal lands managed by the TPWD. Both projects are under the purview of the same TPWD regulatory codes, as well as State Park Division management objectives, operating plans, and senior staff. Due to the similarity of habitat types affected, park operations and management, as well as construction methods, both state park projects are combined for purposes of an analysis of cumulative effects.

#### **8.14.1.2 Temporal Boundaries**

As detailed in Chapter 6 of the FERP/PEIS, the temporal boundary describes how far into the past and forward into the future actions should be considered in the impact analysis. The temporal boundaries may vary for each resource. Once the impacts of the proposed actions are no longer experienced by the affected resource, the cumulative impacts of the other past, present, and reasonably foreseeable future actions need no longer be considered. For the most part, actions considered in this cumulative impacts assessment are those actions that are anticipated to persist beyond the construction period for Phase III proposed projects and those actions that are ongoing.

#### **8.14.2 Identify Resources Affected**

Table 8-11 summarizes the impacts to resources, as discussed in the Environmental Consequences sections for the proposed Texas projects, for both Groups (Artificial Reef Projects and State Park Projects).

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<sup>58</sup> The Corpus Artificial Reef Project would only be implemented in the event that the Ship Reef Project becomes technically infeasible (e.g. an appropriate ship cannot be acquired with available funding).

**Table 8-11. Summary of Impacts of Proposed Phase III Early Restoration Projects in Texas.**

	Geology and Substrates	Hydrology, Floodplain, and Water Quality	Air Quality and GHGs	Noise	Living Coastal and Marine Resources	Protected Species	Socioeconomics and Environmental Justice	Cultural Resources	Land and Marine Management	Aesthetics and Visual Resources	Tourism and Recreational Use	Infrastructure	Public Health and Safety and Shoreline Protection
<b>Group 1: Artificial Reef Projects</b>													
Freeport Artificial Reef	-	s	s	-	s/+	NE/+	+	NE	NE	s	+	NE	NE
Matagorda Artificial Reef	-	s	s	-	s/+	NE/+	+	NE	NE	s	+	NE	NE
Ship Reef	-	s	s	-	-/+	s/+	+	NE	NE	s	s/+	NE	NE
Corpus Artificial Reef	-	s	s	-	s/+	NE/+	+	NE	NE	s	+	NE	NE
<b>Group 2: State Park Projects</b>													
Sea Rim State Park Improvements	-	-/+	s	-	-	NE	+	NE	NE	s	s/+	s/+	NE
Galveston Island State Park Beach Redevelopment	-/+	-/+	s	-	-/+	NE	+	NE	NE	s	s/+	s/+	NE

Table notes:

- Adverse effect
- + Beneficial effect
- s Short-term adverse effect
- NE No effect

Cultural resource investigations have been completed for all Texas proposed projects and consultations are in process. Although the consultation process has not been completed, no cumulative impacts to cultural resources are anticipated. If cultural resources would be impacted, mitigation identified during the consultation process would be implemented.

### 8.14.3 Identify Cumulative Action Scenarios

In this step, the past, present, and reasonably foreseeable future actions to be included in the impact analysis for each specific affected resource are identified. These actions fall within the spatial and temporal boundaries established above.

For purposes of the cumulative impacts analyses in this Chapter, past actions are assumed to already be represented in the state of the affected environment, as discussed in the Environmental Consequences



sections for the proposed Texas projects. Current actions are those that are occurring now and result in ongoing impacts to the same resources that the proposed projects will impact.

Reasonably foreseeable future actions are those actions that are likely to occur and affect the same resource as the proposed projects. The determination of what future actions should be considered requires a level of certainty that they will occur to ensure that the consideration of future actions is not overly speculative. This level of certainty could be met by a number of factors such as the completion of permit applications, the subject of approved proposals or planning documents, or other similar evidence. The temporal boundaries may vary for each resource. Once the impacts of the proposed actions are no longer experienced by the affected resource, the cumulative impacts of the other past, present, and reasonably foreseeable future actions need no longer be considered. For the most part, actions considered in this cumulative impacts assessment are those actions that are anticipated to persist beyond the construction period for Phase III proposed projects and those actions that are ongoing.

#### **8.14.4      Group 1: Artificial Reef Projects**

Table 8-11 summarizes the impacts to resources associated with proposed Texas projects in the nearshore habitats in the Gulf of Mexico off the coast of Texas, comprising recreational use projects. Projects are evaluated together to determine if they have any cumulative effects that, when combined with other past, present, and reasonably foreseeable future actions in nearshore habitats in the Gulf of Mexico off the coast of Texas, may result in cumulative effects to resources.

##### **8.14.4.1      Existing Conditions**

Existing environmental and socioeconomic conditions in and around the permitted artificial reef sites in nearshore waters near Texas are represented by the current state of the affected environment, as described above in the Environmental Consequences sections for the proposed Texas projects. These conditions reflect the environmental impacts of past projects in the area and therefore are the assumed starting point for the cumulative analysis of impacts for past, present, and reasonably foreseeable future actions.

##### **8.14.4.2      Identification of Present and Reasonably Foreseeable Future Actions and Impacts**

Table 8-12 identifies present and reasonably foreseeable future actions in each of the areas described in Chapter 6. For each of the actions, the table provides (1) a brief description of the action and (2) a listing of NEPA resource areas that are the most likely areas of concern for cumulative impacts when the action is considered in conjunction with implementation of the Texas Group 1 Phase III early restoration projects. In most cases, detailed environmental impact data are not available for these actions. Consequently, the analyses generally reflect qualitative best professional judgment about potential impacts. Also, as noted previously, the focus of the cumulative impacts analysis is on the resource areas that are deemed most likely to exhibit cumulative impacts; hence the analysis does not include in the listing those resources where impacts have been judged to be *de minimis*.

**Table 8-12. Other Activities Identified in Group 1.**

Actions <sup>59</sup>	Action Description	Key Resource Areas with Potential for Cumulative Impacts
<i>Ship channel maintenance dredging</i>	<p>Ship channels leading to Texas Ports as well as the Gulf Intracoastal Waterway are routinely dredged to maintain designated depths in order to facilitate waterborne cargo transportation. Current ongoing maintenance dredging projects along the Texas coast include:</p> <ul style="list-style-type: none"> <li>• approximately 19.5 mile of the Corpus Christi Ship Channel between the Corpus Christi Harbor entrance and Aransas Pass scheduled to be complete in May 2014</li> <li>• approximately 9 mile segment of the Houston Ship channel between Redfish Island and the Bayport Channel as well as the Bayport Channel itself scheduled to be complete in October 2014</li> <li>• approximately 25.5 mile section of the Gulf Intracoastal Waterway (GIWW) between High Island and the Bolivar Flare scheduled to be completed in March 2014</li> <li>• approximately 18.6 mile portion of the Neches River Channel in Jefferson and Orange counties scheduled for completion in May 2014.</li> </ul>	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Ongoing oil and gas exploration and production</i>	<p>The coastal region off the coast of Texas is among the most productive for oil and gas exploration and production. During 2013, wells in Texas state waters produced over 470,000 bbls of crude oil and almost 14,000,000 MCF of natural gas (RRC). Federal waters off the Texas coast generated another 51 million bbls of crude oil and 172,000,000 MCF of natural Gas (BOEM). Transport of staff, equipment and supplies necessary to support this exploration and production effort requires a large number of surface vessels and helicopters.</p>	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> </ul>
<i>Seismic exploration</i>	<p>Seismic exploration activities will continue in order to explore and extract belowground mineral resources. These activities help support the economic well-being of Texas and the United states by providing products that are used by other industries and individuals.</p>	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> </ul>
<i>Oil rigs as habitats</i>	<p>Existing oil rigs off the Texas coast provide valuable habitat for diverse sessile marine invertebrate communities and attract pelagic fish that provide increased opportunity for recreational fishing and diving. The number of rigs present is in a constant state of flux as well sites go into and out of production, however the current trend appears to be decreasing as a backlog of no longer needed structures are being removed faster than new rigs are being added.</p>	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Tourism and recreational use</li> </ul>

<sup>59</sup> Note: Texas does not have any ERP Phase I or Phase II projects, and therefore did not include them in the state-level cumulative analysis

<b>Actions<sup>59</sup></b>	<b>Action Description</b>	<b>Key Resource Areas with Potential for Cumulative Impacts</b>
<i>TPWD's Artificial Reef Program</i>	The Artificial Reef Program manages a network of approximately 45 artificial reef sites off the coast of Texas consisting of specially designed structures, former rigs, concrete culverts and rubble and ships. Reef sites support diverse sessile marine invertebrate communities and attract pelagic fish all of which provides increased opportunity for recreational fishing and diving. Future plans call for the expansion of the network through the addition of additional reef sites.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Recreational fishing</i>	The Texas coast is a popular destination for bay, beachfront and offshore fishing. The most recent completed nationwide survey indicates that approximately 751,000 anglers took over 5.2 million fishing trips to the coastal waters of Texas. Direct economic impact of these fishing trips is estimated at over \$890 million.	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Charter fishing</i>	Charter fishing is a practical way for an individual who may not own a boat to enjoy the bounties of the inshore and offshore waters of Texas. Charter captains have years of experience fishing in the local area which will provide a pleasurable experience and should make any fishing trip more relaxing.	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Commercial fishing</i>	The Texas coast supports a fleet of commercial fishing vessels that target primarily demersal bay species as well as offshore reef fish and pelagic species. During 2012, 107 licensed fishermen landed 1.7 million pounds of finfish valued at \$1.6 million.	<ul style="list-style-type: none"> <li>• Water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> </ul>

The resources listed in Table 8-11 would be affected by the Texas Group 1 Phase III early restoration projects (with the exception of Cultural Resources, Land and Marine Management, Infrastructure, and Public Health and Safety). Most of these effects would not be anticipated to extend beyond the construction period. Some resource areas would be affected long-term, some beneficially and some adversely. However, none of the projects proposed in Group 1 would result in any long-term adverse effects that rise above minor effects. All projects proposed under Group 1 would provide long-term benefits to certain resources. Overall, long-term benefits from projects proposed in the Group 1 are expected to outweigh the short-term adverse impacts necessary for project implementation as well as long-term minor adverse effects.

#### 8.14.4.3 Cumulative Impacts Analysis for Group 1: Artificial Reef Projects

Table 8-12 identifies the following resource areas where there is a possibility that impacts of past, present, and reasonably foreseeable future actions might result in interactions or additive effects when combined with Texas Group 1 Phase III early restoration projects. The following resource areas are identified for further cumulative impacts analysis:

- Geology and substrates,
- Water quality,
- Air quality and GHGs,
- Noise,
- Living coastal and marine resources,
- Protected species,
- Socioeconomics and environmental justice,
- Aesthetics and visual resources, and
- Tourism and recreational use.

Cumulative impacts for each of these areas are discussed below.

##### ***Geology and Substrates***

Five actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, and TPWD's Artificial Reef Program) are identified as potential contributors to cumulative impacts on geology and substrates when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect geology and substrates by disturbing sediments during the short-term (dredging, seismic exploration, placement of artificial reef materials, etc.). Actions that have or would continue to result in permanent or long-term conversion of submerged substrates includes oil and gas activities, oil rigs as habitats, and TPWD's Artificial Reef Program.

Texas Group 1 Phase III early restoration projects would have minor short-term and long-term impacts to geology and substrates (Table 8-11). Placement of artificial reef materials unto the ocean substrates would result in a short-term disturbance of the substrate caused by suspension of sediment in the water column during project implementation. Long-term there would be some substrate compaction associated with weight of each structure. Overall the disturbances to substrates would be minor and isolated to the area immediately under or near the reef structure. Overall, the proposed Group 1 projects would not result in changes to the character of the substrates or geologic features beyond the footprint of structure itself.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to geology and substrates would likely occur. Based on the relatively small footprint of projects proposed in Group 1 and the availability of other soft sediment and substrates in the project areas, Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse impacts to geology and substrates.

### ***Water Quality***

All eight actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) are identified as potential contributors to cumulative impacts on water quality when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect water quality in the short-term and long-term. Ship channel maintenance dredging, oil and gas exploration and production, offshore fishing, and seismic exploration can all adversely affect water quality from vessel operation, oil or other fluid spills, ship collisions (such as the recent Texas City Y spill), and turbidity associated with in-water activities. Other water quality impacts include pollutants from construction or those carried in runoff from marine transportation, coastal development, and tourism, and recreation facility operations after construction.

Texas Group 1 Phase III early restoration projects would have minor short-term impacts to water quality (Table 8-11). The majority of impacts from the projects would be related to temporary increases of turbidity during project implementation. The artificial reefs would not result long-term impacts to water quality and nor are they expected to be a source of pollutants.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to water quality would likely occur. Based on the depth of the reef structures and the distance from past, present, and reasonably foreseeable future actions, Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse impacts to water quality.

### ***Air Quality and GHGs***

All eight actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) would affect air quality and produce GHG emissions when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect air quality and produce GHG emissions in the short-term and long-term. Oil and gas exploration, commercial and recreational fishing, and seismic exploration all require vehicles, other equipment, or procedures activities that produce emissions. The impacts would occur mainly during construction with limited long-term operational impacts. Construction and operations impacts of each action would be short to long-term in nature, would constitute a very small portion of the overall inventory of air emissions in the region, and would not be expected to violate state or federal standards. For operations, all facilities, would follow applicable federal and state regulations, and would not be expected to change the air quality attainment status of the region.

The Texas Group 1 Phase III early restoration projects would also impact air quality and produce GHG emissions. The projects in Group 1 would not violate any state or federal standards. After project completion, impact to air quality would be limited to ambient pollutants from boat traffic. Increased boat traffic caused by anglers traveling to the reef would potentially increase air pollution in the vicinity; however, levels would still be anticipated to be *de minimis*. Therefore, any adverse impacts to air quality would be short-term and minor.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse air quality impacts would likely occur. However, Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse air quality impacts.

### **Noise**

All eight actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) would produce noise. Many actions described in Table 8-12 may affect noise in the short-term and long-term. Oil and gas exploration, commercial and recreational fishing, and seismic exploration all use motorized equipment that can produce sound and some activities such as seismic exploration may result in major noise effects in the short-term. In most cases, the noise impacts would be of relatively short duration, ending upon completion of construction activities, and are projected to result in only minor adverse impacts. Noise levels for normal operations and use will be increased but not at an excessive level given surrounding land use.

The proposed Texas Group 1 Phase III early restoration projects would have short-term construction related noise impacts and only minimal increases in noise that would persist beyond construction. After completion, the noise level should be limited to ambient noise from boat traffic. Increased boat traffic caused by anglers and divers traveling to the reef would increase the noise level in the vicinity; however, that noise level would be associated with the activity and not dissuade users of the area.

When Texas Group 1 Phase III projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse noise impacts would likely occur. Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse noise impacts.

### ***Living Coastal and Marine Resources***

All eight actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) are identified as potential contributors to cumulative impacts (adverse and beneficial) to living coastal and marine resources when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect living and coastal marine resources in the short-term and long-term. Oil and gas exploration, offshore fishing, and seismic exploration have disturbed habitats via habitat conversion (converting soft sediment to active drilling operation facilities) or by disturbance of the water column or substrate from the use of equipment and/or the use of vessels. In contrast, oil rigs as habitat and TPWD's artificial reef program have provided long-term benefits to certain habitats by providing more surface area to create habitat for sessile organisms, which can then benefit a multitude of other aquatic and marine species. Activities such as oil and gas exploration and production, commercial fishing, and ship channel maintenance dredging have contributed to habitat alterations in areas that living and coastal marine resources rely on for breeding, foraging and other uses. The majority of adverse impacts potentially caused by the actions listed in Table 8-12 would be localized in nature and would not spatially overlap with the proposed Group 1 Phase III early restoration projects.



Texas Group 1 Phase III early restoration projects would have minor short-term adverse impacts to benthic fauna and long-term beneficial impacts to living coastal and marine resources resulting from the construction of artificial reefs. The projects would adversely impact benthics and soft bottom habitat by the placement of reef materials and conversion from naturally occurring soft bottom to artificial hard bottom substrate. These impacts would provide long-term benefits to species that use reef habitat.

Long-term, Group 1 projects are not expected to substantially contribute to increasing pressure on marine fish populations. While, the Trustees will not be conducting any additional project-specific monitoring to assess fisheries impacts, the TPWD routinely collects information to assess marine fish populations. These data collection efforts include on-site, end-of-trip interviews of recreational anglers at coastal boat-access sites; rove counts at boat ramps to determine the number of boating parties using each boat-access site; a Statewide Angler Survey every 3 years to monitor basic trends in fishing activity; and license sales.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to living coastal and marine resources would likely occur. However, Group 1 projects would not contribute substantially to cumulative adverse impacts to living coastal and marine resources. Group 1 Phase III early restoration projects, carried out in conjunction with other restoration efforts have the potential to provide some long-term beneficial cumulative impacts to living coastal and marine resources.

### ***Protected Species***

All eight actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) are identified as potential contributors to cumulative adverse and beneficial impacts on protected species when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect protected species in the short-term and long-term. Ship channel maintenance dredging, oil and gas exploration, fishing, and seismic exploration may result in adverse impacts to protected species. These ongoing activities have all contributed to habitat alterations in areas that protected species rely on for breeding, foraging and other uses. However, oil rigs as habitat and TPWD's artificial reef program have provided long-term benefits to certain protected species by providing additional hard substrate that supports a more diverse community of benthic organisms and fish.

Texas Group 1 Phase III early restoration projects are not likely to adversely affect protected species. All projects are subject to environmental reviews and employ best management practices and follow all applicable guidelines to prevent adverse effects to protected species. NMFS concurred that the pyramid artificial reef projects are not likely to adversely affect federally listed and candidate species or critical habitats (NMFS 2014a). The EFH assessment and NMFS concurrence determined that temporary and localized turbidity impacts and permanent impacts to soft bottom EFH would occur during implementation of the artificial reef projects. However, the creation of new hard structure in the Gulf may also create benefits to some species managed under the Magnuson-Stevens Act by providing foraging habitat, cover, and conditions favorable for encrusting benthic colonization (NMFS 2014d). The explosives plan that would be used to deploy the ship would include input from the NMFS to minimize

the overall noise impacts above and below the water line and prevent any disturbance to protected species.

Following project implementation, long-term impacts from Group 1 projects would be beneficial. The addition of hard substrate would support a more diverse community of benthic organisms and fish. In addition, the avoidance of artificial reefs areas by the commercial shrimp trawling industry should have a positive impact to sea turtles by providing habitat in which turtles can avoid entanglement in trawls. Overall, the addition of the artificial reef should have a positive impact on federally-listed sea turtles such as the hawksbill, green, leatherback, loggerhead, and Kemp's ridley, by enhancing their foraging habitat.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to protected species are not likely to occur. Group 1 projects would not contribute to cumulative adverse impacts to protected species. Group 1 Phase III early restoration projects, carried out in conjunction with other restoration efforts have the potential to provide some long-term beneficial cumulative impacts to protected species.

#### ***Socioeconomics and Environmental Justice***

Seven of the actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) are identified as potential contributors to cumulative beneficial impacts when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect socioeconomics and environmental justice in the short-term and long-term. Actions such as oil and gas exploration, commercial fishing, and seismic exploration would contribute to socioeconomic benefit along the Texas coast through job creation, increased local sales, and potential increased demand for local business services. Additionally, the increase in workers and tourism related activities would increase revenues in local communities. No adverse impacts are anticipated from any of these actions.

Texas Group 1 Phase III early restoration projects would have short and long-term beneficial socioeconomic impacts related to construction and on-going operations. There would be no adverse socioeconomic impacts from the Group 1 projects. However, these projects would benefit the local economies adjacent to the project site by increasing use of the harbors, boat ramps, bait camps, and private fishing charter businesses. The Group 1 projects would contribute to socioeconomic benefit along the Texas coast from job creation and spending resulting from enhanced tourism and recreation activities in the area.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, there would be no adverse socioeconomic impact. Group 1 projects would not contribute substantially to cumulative adverse socioeconomic impacts. Group 1 Phase III early restoration projects, carried out in conjunction with other actions have the potential to provide some long-term beneficial cumulative socioeconomic impacts.

### ***Aesthetics and Visual Resources***

Seven of the actions (ship channel maintenance dredging, ongoing oil and gas exploration and production, seismic exploration, TPWD's Artificial Reef Program, recreational fishing, charter fishing, and commercial fishing) are identified as potential contributors to adverse cumulative impacts to aesthetics and visual resources when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect aesthetics and visual resources in the short-term and long-term. For the majority of actions, impacts would be minor and limited to the visual impacts of additional vessels on the landscape. For projects such as channel maintenance dredging and ongoing oil and gas exploration and production, impacts would be related to the additional infrastructure needed to conduct the respective activities. These actions would be offshore and have minimal adverse impact on the experiences of others.

The Texas Group 1 Phase III early restoration projects would have short-term adverse impacts, which would occur only during deployment of the artificial reef materials. Similarly the Group 1 projects are aimed at benefitting recreational experiences. After completion, visual impacts would be limited to boat traffic. Increased boat traffic caused by anglers traveling to the reef would be consistent with the surroundings or designated uses. The boats would not negatively attract attention, dominate the view, or detract from the current user activities or experiences. Thus, implementation of Group 1 projects may result in additional vessel traffic, but this would not substantially contribute to cumulative effects to aesthetic and visual resources.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to aesthetics and visual resources would likely occur. Group 1 Phase III early restoration projects would not contribute substantially to cumulative adverse impacts.

### ***Tourism and Recreational Use***

Five actions (ship channel maintenance dredging, oil rigs as habitats, TPWD's Artificial Reef Program, recreational fishing, and charter fishing) are identified as potential contributors to cumulative adverse and beneficial impacts (primarily beneficial) to tourism and recreation when their impacts are combined with those of the Texas Group 1 Phase III early restoration projects. Many actions described in Table 8-12 may affect tourism and recreational use in the short-term and long-term. Projects such as TPWD's artificial reef program, recreational fishing, etc., provide beneficial impacts to tourism and recreational use. Oil and gas exploration and seismic exploration may adversely impact tourism and recreational use long-term by discouraging recreational uses in areas immediately surrounding the specified action but these actions do not intersect heavily with areas that are generally used for recreation. Dredging activities may affect recreational fishing, however, this would be only a short-term and localized impact. Oil rigs as habitat and placement of artificial reefs have provided long-term benefits to certain recreational activities such as fishing and diving due to the created reef habitat.

The Texas Group 1 Phase III early restoration projects are aimed at benefitting recreational experiences and would provide benefit to tourism and recreation. Visitation to the artificial reefs are expected to provide long-term beneficial impacts to tourism and recreation.

When Texas Group 1 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, there are no short-term cumulative adverse impacts to tourism and recreation. Group 1 projects would therefore not contribute substantially to cumulative adverse impacts to tourism and recreation. Group 1 Phase III early restoration projects, carried out in conjunction with other actions have the potential to provide some long-term beneficial cumulative impacts to tourism and recreation.

#### **8.14.4.4 Summary of Impacts for Group 1: Artificial Reef Projects**

Based on the above analysis of present and reasonably foreseeable future actions and the anticipated resources to be impacted for these actions, Texas Group 1 Phase III early restoration projects would not substantially contribute to adverse cumulative effects to resources. Group 1 projects, carried out in conjunction with other actions, have the potential to provide long-term beneficial cumulative impacts to living coastal and marine resources, protected species, socioeconomics, tourism and recreational use.

#### **8.14.5 Group 2: State Park Projects**

Table 8-11 summarizes the impacts to resources associated with proposed Texas state park projects located along the northern Texas coast on coastal lands managed by the TPWD. Projects are evaluated together to determine if they have any cumulative effects that, when combined with other past, present, and reasonably foreseeable future actions along the northern Texas coast on managed coastal lands, may result in cumulative effects to resources.

##### **8.14.5.1 Existing Conditions**

Existing environmental and socioeconomic conditions in and around the state park projects along the upper Texas coast are represented by the current state of the affected environment, as described above in the Environmental Consequences sections for the proposed Texas projects. These conditions reflect the environmental impacts of past projects in the area and therefore are the assumed starting point for the cumulative analysis of impacts for past, present, and reasonably foreseeable future actions.

##### **8.14.5.2 Identification of Present and Reasonably Foreseeable Future Actions and Impacts**

Table 8-13 identifies present and reasonably foreseeable future actions in each of the areas described in Chapter 6. For each of the actions, the table provides (1) a brief description of the action and (2) a listing of NEPA resource areas that are the most likely areas of concern for cumulative impacts when the action is considered in conjunction with implementation of the Texas Group 2 Phase III early restoration projects. In most cases, detailed environmental impact data are not available for these actions. Consequently, the analyses generally reflect qualitative best professional judgment about potential impacts. Also, as noted previously, the focus of the cumulative impacts analysis is on the resource areas that are deemed most likely to exhibit cumulative impacts; hence the analysis does not include in the listing those resources where impacts have been judged to be *de minimis*.

**Table 8-13. Other Activities Identified in Group 2.**

<b>Actions<sup>60</sup></b>	<b>Action Description</b>	<b>Key Resource Areas with Potential for Cumulative Impacts</b>
<i>Sea Rim State Park dune restoration*</i>	The sand dunes on the upper Texas Coast have been severely impacted by several major storm events over the past decade and are almost nonexistent today. The goal is to reestablish the dunes to allow the dunes and beaches to dissipate wave energy from storm events. The Sea Rim State Park dune restoration will restore 5.3 miles of dune habitat by placing sand fencing and planting native dune vegetation to trap wind-blown sand and accelerate natural dune recovery.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Galveston Island State Park marsh restoration and protection*</i>	The project includes two components: creating 30 acres of marsh via dedicated dredging and placement of appropriate sediments within the Carancahua Cove area and engineering and design of rock breakwaters within the Carancahua and Dana Cove areas.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>West Galveston Bay conservation corridor habitat preservation*</i>	This project proposes to acquire a permanent conservation easement on a contiguous 3,200 acre tract(s) of estuarine emergent marsh, open water, prairie depressional wetlands and upland prairie habitat. This tract is located within the West Bay Conservation Corridor in close proximity to 6,500 acres of conserved habitat.	<ul style="list-style-type: none"> <li>• Hydrology, floodplain, and water quality</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> </ul>
<i>JD Murphree Wildlife Management Area/ McFaddin National Wildlife Refuge beach ridge</i>	On McFaddin National Wildlife Refuge a clay and sand berm has been partially constructed with the remainder of the project to be completed at a later date. The berm will help restore ecological functions altered by recent hurricanes by keeping gulf waters from regularly overwashing the beach and entering interior marshes.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>

<sup>60</sup> Note: Texas does not have any ERP Phase I or Phase II projects, and therefore did not include them in the state-level cumulative analysis

Actions <sup>60</sup>	Action Description	Key Resource Areas with Potential for Cumulative Impacts
<i>McFaddin National Wildlife Refuge terracing</i>	Earthen terraces are planned for installation at McFaddin NWR within the Willow Lake complex area. Planting intertidal and high-marsh plants on the terraces will help reduce wave-fetch generated erosion, increase shoreline to water transitional areas for fisheries, increase fisheries production, provide potential bird nesting habitat, and create habitat more suitable for submerged aquatic vegetation.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Beach nourishment</i>	Beach nourishment, as envisioned for these projects, will be a process of placing sand onto an eroding shoreline to enhance or widen existing beaches. While the source of the supply of beach nourishment sand may come from many sources the ultimate goal is to enhance beaches that will continue to be used for recreation purposes.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>West Bay coastal marsh restoration</i>	Restoration of costal marsh in areas where relative elevations have decreased. Methods to increase elevation include the use of geo-textile tubes or dredged sediments.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology and water resources</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> </ul>
<i>Farm to Market Road (FM) 3005 improvements</i>	Improvements to FM 3005 will be made in order to facilitate access to the proposed campground facilities in Galveston Island State Park. The improvements would be adjacent to the campground and would occur in conjunction with the Galveston Island State Park Beach Redevelopment Project. The Texas Department of Transportation has plans to repair and resurface significant portions of FM 3005 from the west end of Galveston's Seawall to San Louis Pass over the next few years. The 9 mile length of FM 3005 between San Louis Pass and Jamaica Beach will be repaired. The 10 miles of FM 3005 from a point approximately 3 miles west of Jamaica Beach to the west end of Galveston's seawall will be resurfaced.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> <li>• Infrastructure</li> </ul>



Actions <sup>60</sup>	Action Description	Key Resource Areas with Potential for Cumulative Impacts
<i>State wildlife management areas and federal wildlife refuges</i>	Texas wildlife management areas and federal wildlife refuges will continue to manage lands for recreational activities including but not limited to public hunting, hiking, camping while conserving wildlife, plants, and their habitats.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Tourism and recreational use</li> </ul>
<i>Great Texas Coastal Birding Trail</i>	The Great Texas Coastal Birding Trail is a state-designated system of trails, bird sanctuaries, and nature preserves along the entire length of the Texas Gulf Coast. The trail system is managed by the Texas Parks and Wildlife Department and one can observe many varieties of bird species, animals, plants and habitats as part of the Great Texas Coastal Birding Trail.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> <li>• Infrastructure</li> </ul>
<i>Recreational fishing</i>	The Texas coast is a popular destination for bay, beachfront and offshore fishing. The most recent completed nationwide survey indicates that approximately 751,000 anglers took over 5.2 million fishing trips to the coastal waters of Texas. Direct economic impact of these fishing trips is estimated at over \$890 million.	<ul style="list-style-type: none"> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Tourism and recreational use</li> </ul>
<i>Ongoing oil and gas exploration and production</i>	The coastal region off the coast of Texas is among the most productive for oil and gas exploration and production. During 2013, wells in Texas state waters produced over 470,000 bbls of crude oil and almost 14,000,000 MCF of natural gas (RRC). Federal waters off the Texas coast generated another 51 million bbls of crude oil and 172,000,000 MCF of natural Gas (BOEM). Transport of staff, equipment and supplies necessary to support this exploration and production effort requires a large number of surface vessels and helicopters.	<ul style="list-style-type: none"> <li>• Geology and substrates</li> <li>• Hydrology, floodplain, and water quality</li> <li>• Air quality and GHGs</li> <li>• Noise</li> <li>• Living coastal and marine resources</li> <li>• Protected species</li> <li>• Socioeconomics and environmental justice</li> <li>• Aesthetics and visual resources</li> <li>• Infrastructure</li> </ul>

Table notes:

\* These restoration projects will be funded through the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund, which will create 5.3 miles of dunes, construct 30 acres of estuarine wetlands and 30 acres of oyster reef, conserve 3,200 acres of coastal habitat and create 3,000 acres of freshwater wetlands primarily on the upper Texas coast.

The resource areas listed in Table 8-13 would be affected by at least one of the projects proposed under Texas Group 2 Phase III early restoration projects (with the exception of Cultural Resources, Land and Marine Management, and Public Health and Safety). Most of these effects would not be anticipated to extend beyond the construction period. Some resource areas would be affected long-term, some beneficially, and some adversely. However, none of the projects proposed under Group 2 would result in any long-term adverse effects that rise above a minor status. All projects proposed under Group 2 would provide long-term benefits to certain resources. Overall, long-term benefits from projects proposed in the Group 2 region are expected to outweigh the short-term adverse impacts necessary for project implementation as well as long-term minor adverse effects.

#### **8.14.5.3 Cumulative Impacts Analysis for Group 2: State Park Projects**

Table 8-13 identifies the following resource areas where there is a possibility that impacts of past, present, and reasonably foreseeable future actions might result in interactions or additive effects when combined with Texas Group 2 Phase III early restoration projects. The following resource areas are identified for further cumulative impacts analysis:

- Geology and substrates
- Hydrology, floodplain, and water quality,
- Air quality and GHGs,
- Noise,
- Living coastal and marine resources,
- Protected species,
- Socioeconomics and environmental justice,
- Aesthetics and visual resources,
- Tourism and recreational use, and
- Infrastructure.

Cumulative impacts for each of these areas are discussed below.

##### ***Geology and Substrates***

Ten actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, Farm to Market Road (FM) 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts on geology and substrates when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect geology and substrates by disturbing sediments on, during, or as a result of construction activities. Activities identified above that have resulted in or would continue to result in permanent or long-term adverse impacts to geology and substrates include FM 3005 improvements as well as oil and gas exploration and production. West Bay coastal marsh restoration, beach nourishment, Sea Rim State Park dune restoration, and McFaddin National Wildlife Refuge terracing are all restoration activities that would provide a positive benefit to geology and substrates. It is anticipated that these types of activities will continue into the future.

The proposed projects in Group 2 would contribute to long-term impacts to geology and substrates by adding infrastructure in the state parks. Impacts would be minor and where possible activities would be confined to previously disturbed areas. In order to minimize impacts, established BMPs such as an erosion control and storm water management plan, the installation of sediment traps prior to commencement of construction activities, and ongoing construction monitoring would be implemented.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to geology and substrates would likely occur. Overall, the proposed Group 2 projects would not result in changes to the character of the sediments or geologic features beyond the footprint of the project area. Based on the relatively small footprint of projects proposed in Group 2 Phase III early restoration projects, they would not contribute substantially to cumulative adverse impacts to geology and substrates.

### ***Hydrology, Floodplain, and Water Quality***

All twelve actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, West Galveston Bay conservation corridor habitat preservation, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts on hydrology, floodplain, and water quality when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect hydrology, floodplain, and water quality in the short-term and long-term. Projects such as the FM 3005 improvements and Texas Coastal Birding Trail could alter the flow of water and have a minor adverse effect on hydrology and water resources. Other projects such as the Sea Rim State Park dune restoration, McFaddin Wildlife Refuge terracing, West Bay coastal marsh restoration, and the State Wildlife Management Areas and Federal Wildlife Refuges Projects will have a beneficial effect by restoring functions that were previously altered in order to improve water resources and hydrology.

Storm water runoff during construction of the Texas Group 2 Phase III early restoration projects may result in short-term, minor impact to surface water quality. The implementation of mitigation measures, including development of a comprehensive storm water pollution prevention plan, would make the intensity of the construction-related impacts negligible. The required wetland mitigation is compensation for the lost floodplain values and may increase the floodplain storage for the Galveston Island State Park Project. In addition, the project is designed with beach access boardwalks, elevated structures, and transitional elements to reduce the amount of development within the floodplain as well as respond to a changing coastal morphology which is anticipated at the Gulf beach over the coming decades. Overall, Group 2 projects provide long-term benefits to the floodplain area. Due to the loss of impervious areas, there would be minor, short-term and long-term adverse impacts to the localized hydrology.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short and long-term cumulative adverse impacts to hydrology, floodplain, and water quality would likely occur. Based small-scale and localized nature, the

Group 2 projects would not contribute substantially to cumulative adverse impacts to hydrology, floodplain, and water quality. Group 2 Phase III early restoration projects, carried out in conjunction with other restoration efforts have the potential to provide some long-term beneficial cumulative impacts to hydrology, floodplain, and water quality.

### ***Air Quality and GHGs***

Eleven actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts to air quality and produce GHG emissions when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect air quality and produce GHG emissions in the short-term and long-term. The impacts would occur mainly during construction with limited long-term operational impacts. Construction and operations impacts of each action would be short to long-term in nature, would constitute a very small portion of the overall inventory of air emissions in the region, and would not be expected to violate state or federal standards. For operations, all facilities, would follow applicable federal and state regulations, and would not be expected to change the air quality attainment status of the region.

The Texas Group 2 Phase III early restoration projects would also cause impacts to air quality and produce GHG emissions in the short-term during construction activities. All projects identified in Group 2 are anticipated meet state or federal standards and would not exceed the *de minimis* level for any criteria pollutants. Air emissions during the construction phase of the Group 2 projects are anticipated to be minor, short-term and would not contribute to cumulative air quality effects. Therefore, any adverse impacts to air quality would be short-term and minor.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse air quality impacts would likely occur. However, Group 2 Phase III early restoration projects would not contribute substantially to cumulative adverse air quality impacts.

### ***Noise***

Eleven actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) would produce noise. Many actions described in Table 8-13 may affect noise in the short-term and long-term. In most cases, the noise impacts would be of relatively short duration, ending upon completion of construction activities, and are projected to result in only minor adverse impacts. Noise levels for normal operations and use will be increased but not at an excessive level given surrounding land use. Increases in noise long-term from the Texas Birding Trail and recreational fishing would be minor and related to recreational use of the resources.

Adverse effects from the Texas Group 2 Phase III early restoration projects would be related to construction activities in the short-term and recreational use in the long-term. Minimization measures to limit noise would be used during construction of Group 2 projects. Once facilities are constructed, noise can be generated from facility operations and the vehicles associated with these facilities. However, these noise levels would be representative of a campground and similar in nature to those generated prior to the hurricanes. Overall, long-term noise effects from personal vehicle use, swimming and other recreational activities would be minor.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse noise impacts would likely occur. Group 2 Phase III early restoration projects would not contribute substantially to cumulative adverse noise impacts.

### ***Living Coastal and Marine Resources***

All twelve actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, West Galveston Bay conservation corridor habitat preservation, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts living coastal and marine resources when their impacts when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect living coastal and marine resources when their impacts in the short-term and long-term. Projects such as beach nourishment, McFaddin Wildlife Refuge terracing, West Bay coastal marsh restoration, and the Sea Rim State Park dune restoration would cause adverse impacts by displacing wildlife and flora during the construction activities and converting habitat types. The Texas Birding Trail, the State Wildlife Management Areas and Federal Wildlife Refuges and recreational fishing would cause minor impacts to wildlife during maintenance and recreational activities. Other projects such as the Sea Rim State Park dune restoration, McFaddin Wildlife Refuge terracing, West Bay coastal marsh restoration, and the State Wildlife Management Areas and Federal Wildlife Refuges Projects will have a beneficial impact on living coastal marine resources by restoring functions that were previously altered in order to improve water resources and hydrology.

Texas Group 2 Phase III early restoration projects would also cause living marine resources to be displaced as a result of the construction activities. Conversely, the projects would also provide a benefit by building infrastructure and signage that would help prevent impacts to the coastal resources from the recreational users. Project impacts from increased visitor use could include littering and noise from visitors utilizing the new facilities. Group 2 projects will be, in part, replacing and/or enhancing recreational facilities that were damaged or destroyed by Hurricane Ike. These projects are intended to increase user traffic to numbers similar to those pre-hurricane. Long-term adverse impacts due to increased visitation levels higher than pre-hurricane levels will be monitored and addressed as necessary by the state park using existing TPWD procedures.

Long-term, Group 2 projects are not expected to contribute substantially to increasing pressure on marine fish populations. While, the Trustees will not be conducting any additional project-specific monitoring to assess fisheries impacts, the TPWD routinely collects information to assess marine fish populations. These data collection efforts include on-site, end-of-trip interviews of recreational anglers at coastal boat-access sites; rove counts at boat ramps to determine the number of boating parties using each boat-access site; a Statewide Angler Survey every 3 years to monitor basic trends in fishing activity; and license sales.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to living coastal and marine resources would likely occur. However, Group 2 projects would not contribute substantially to cumulative adverse impacts to living coastal and marine resources. Group 2 Phase III early restoration projects, carried out in conjunction with other restoration efforts have the potential to provide some long-term beneficial cumulative impacts to living coastal and marine resources.

### ***Protected Species***

All twelve actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, West Galveston Bay conservation corridor habitat preservation, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts to protected species when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect protected in the short-term and long-term. Projects such as the FM 3005 improvements and oil and gas exploration and production would impact protected species by displacing species during construction and for the duration of the project. In contrast projects such as the West Bay coastal marsh restoration, state wildlife management areas and federal wildlife refuges would benefit protected species by preserving or enhancing habitat.

Texas Group 2 Phase III early restoration projects are not likely to adversely affect protected species. All projects are subject to environmental reviews and employ best management practices and follow all applicable guidelines to prevent adverse effects to protected species. Impacts to protected species and their habitats may occur during construction of portions of the Group 2 projects, but would be localized and temporary. Disturbance to individual species would occur in the construction areas; however, there would be no change in the diversity or local populations of protected species.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to protected species are not likely to occur. Group 2 projects would not contribute to cumulative adverse impacts to protected species. Group 2 Phase III early restoration projects, carried out in conjunction with other restoration efforts have the potential to provide some long-term beneficial cumulative impacts to protected species.



### ***Socioeconomics and Environmental Justice***

Eleven actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative beneficial impacts when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 would provide a socioeconomic benefit through job creation, increased local sales, and potential increased demand for local business services. Additionally, the increase in workers and tourism related activities would increase revenues in local communities. No adverse impacts are anticipated from any of these actions.

Texas Group 2 Phase III early restoration projects would have a short and long-term beneficial socioeconomic impacts related to construction and on-going operations. There would be no adverse socioeconomic impacts from the Group 2 projects. Beneficial economic effects would accrue to local recreational supply retailers, restaurants, and hospitality providers. The Group 2 projects would contribute to socioeconomic benefit along the Texas coast from job creation and spending resulting from enhanced tourism and recreation activities in the area.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, there would be no adverse socioeconomic impact. Group 2 projects would not contribute substantially to cumulative adverse socioeconomic impacts. Group 2 Phase III early restoration projects, carried out in conjunction with other actions have the potential to provide some long-term beneficial cumulative socioeconomic impacts.

### ***Aesthetics and Visual Resources***

Ten actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, West Bay coastal marsh restoration, FM 3005 improvements, Texas Coastal Birding Trail, recreational fishing, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts to aesthetics and visual resources when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect aesthetics and visual resources in the short-term and long-term. Temporary impacts to visual resources would result from restoration, construction, maintenance, recreational use, or oil and gas exploration and production activities. For projects such as ongoing oil and gas exploration and production and FM 3005 improvements, impacts would be related to the additional infrastructure provided by the respective activities.

Temporary impacts to visual resources would result from construction of the proposed Texas Group 2 Phase III early restoration projects. Large construction equipment such as backhoes for campground construction would temporarily obstruct the shoreline views for visitors and recreational users at the sites. Construction from the Group 2 projects would change the view shed, but the construction would be consistent with the other amenities located in the parks. The structures would not negatively attract

attention, dominate the view, or detract from the current user activities or experiences. Any adverse impacts to aesthetic and visual resources would be short-term and minor.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to aesthetics and visual resources would likely occur. Group 2 Phase III early restoration projects would not contribute substantially to cumulative adverse impacts.

### ***Tourism and Recreational Use***

Eight actions (Sea Rim State Park dune restoration, Galveston Island State Park marsh restoration and protection, JD Murphree Wildlife Management Area/McFaddin National Wildlife Refuge beach ridge, McFaddin National Wildlife Refuge terracing, beach nourishment, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, Texas Coastal Birding Trail, are recreational fishing) are identified as potential contributors to cumulative impacts to tourism and recreation when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. Many actions described in Table 8-13 may affect tourism and recreational use in the short-term and long-term. The actions would cause minor adverse effects to tourism and recreational use during construction, maintenance activities, or oil and gas exploration and production activities. Projects such as beach nourishment, FM 3005 improvements, state wildlife management areas and federal wildlife refuges, and the Great Texas Coastal Birding Trail would provide long-term benefits by increasing or enhancing recreational facilities, infrastructure, and/or habitat which could increase tourism or improve recreational experiences.

Texas Group 2 Phase III early restoration projects would have a short-term adverse effect on tourism and recreational use during the construction phase of the projects. Access to certain areas may be restricted or impacted to some degree during construction activities. The construction may have moderate impacts to public access and use of the beach. While these temporary inconveniences would result in moderate short-term impacts on tourism and recreational use during the construction activities, over the long-term improved access and enhanced facilities would provide substantial benefits to tourism and recreational use. Any adverse impacts from Group 2 projects to tourism and recreational use would be short-term and no greater than moderate.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to tourism and recreational use would likely occur. However, Group 2 projects would not contribute substantially to cumulative adverse impacts to tourism and recreation. Group 2 Phase III early restoration projects, carried out in conjunction with other actions have the potential to provide some long-term beneficial cumulative impacts to tourism and recreation.

### ***Infrastructure***

Three actions (FM 3005 improvements, Great Texas Coastal Birding Trail, and ongoing oil and gas exploration and production) are identified as potential contributors to cumulative impacts on infrastructure when their impacts are combined with those of the Texas Group 2 Phase III early restoration projects. FM 3005 improvements and the Great Texas Coastal Birding Trail would provide

infrastructure to improve recreational experiences. Ongoing oil and gas activities would increase infrastructure needed for fuel exploration and production.

Group 2 projects would also provide additional infrastructure such as a campground, comfort station, fish cleaning shelter, etc., which would enhance recreational experiences. During construction activities, there would be minor short-term disruptions of public access to some facilities. Infrastructure benefits resulting from these projects are anticipated to be long-term.

When Texas Group 2 Phase III early restoration projects are analyzed in combination with other past, present, and reasonably foreseeable future actions, short-term cumulative adverse impacts to infrastructure would likely occur. However, Group 2 projects would not contribute substantially to cumulative adverse impacts to infrastructure. Group 2 Phase III early restoration projects, carried out in conjunction with other actions have the potential to provide some long-term beneficial cumulative impacts to infrastructure.

### **Summary of Impacts of Group 2: State Park Projects**

Based on the above analysis of present and reasonably foreseeable future actions and the anticipated resources to be impacted for these actions, Texas Group 2 Phase III early restoration projects would not substantially contribute to adverse cumulative effects to resources. Group 2 projects, carried out in conjunction with other actions, have the potential to provide long-term beneficial cumulative impacts to living coastal and marine resources, protected species, socioeconomics, tourism and recreational use, and infrastructure.

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